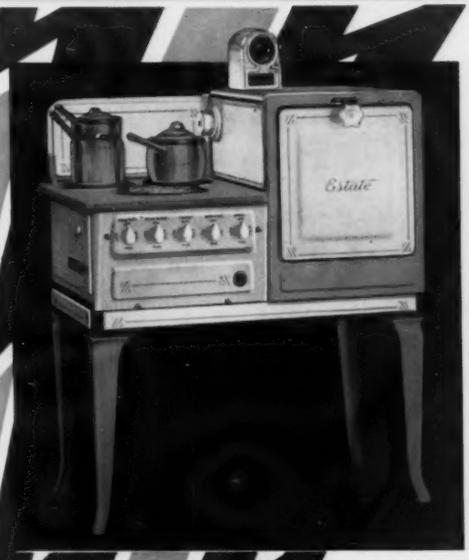
# Electrical West

With which is consolidated the Journal of Electricity

A McGraw-Hill Publication | MARCH 1, 1928 | Twenty-five Cents per Copy






## ESTATE *Electric* RANGES AGLOW *with* COLOR!

*STRIKING! Estate Electric Ranges decorated in sparkling colors—Jade Green and Mandarin Red. Astute merchandising men will quickly sense the possibilities of these modish new electric ranges, and the stir it will create among women everywhere.*

*Trim-looking, graceful, with not a nut, bolt or hinge in sight. Electric ranges of rare beauty. And superior in performance, too. Balanced oven heat. Single switch control. Independent broiler coil. Oven units balanced across the 220 volts on all three positions of oven switch. Automatic temperature control and timing device for full automatic control. A modern range for the modern kitchen!*

*Write or wire so that we may place the complete details before you quickly.*

*THE ESTATE STOVE COMPANY, Hamilton, Ohio*

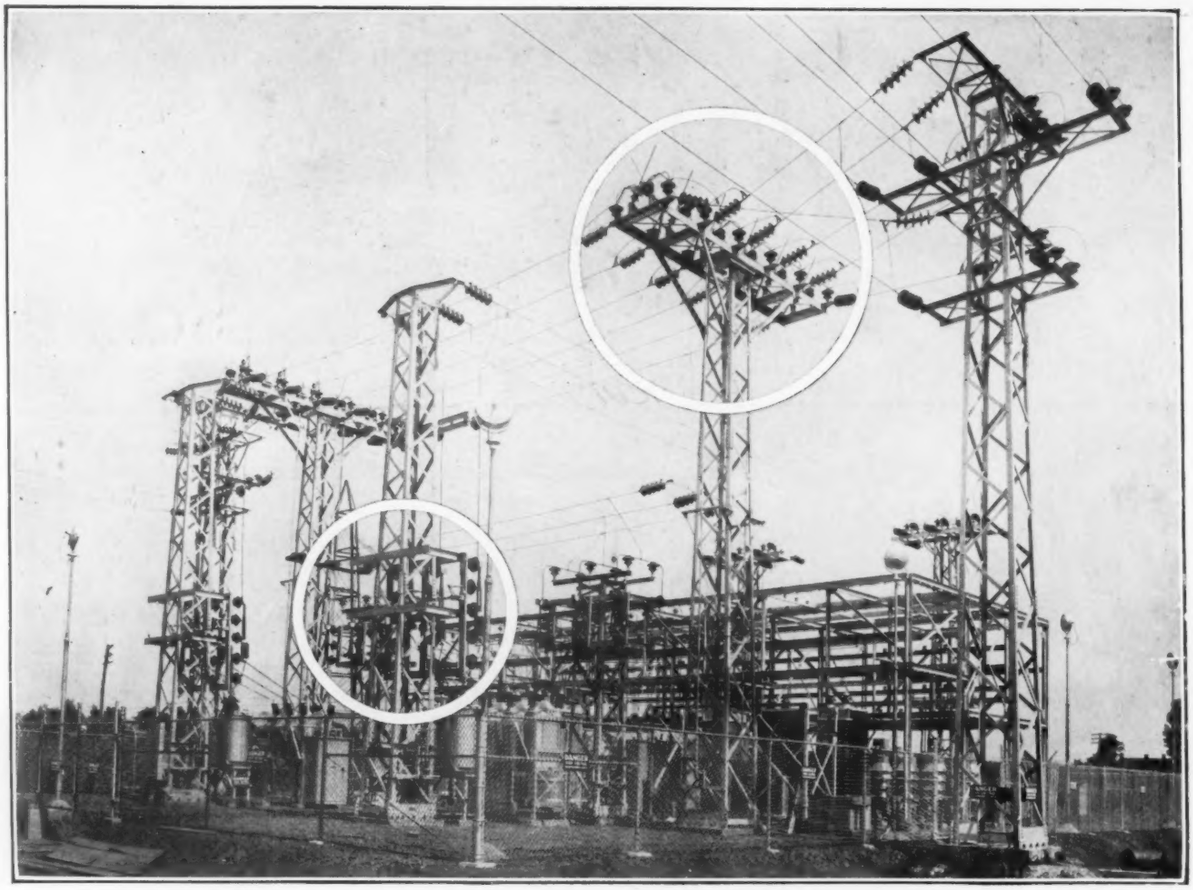
*San Francisco* — *180 New Montgomery St.*

*House Founded 1845*

*Portland, Ore.* — *Terminal Sales Building*

*Estate* ELECTRIC RANGES

*with automatically controlled,* balanced *oven heat*



# Ok in O

Here's a snapshot in Ohio where control is O.K.

The lower circled portion shows Elpeco Group Operated Disconnects.

The upper mark circles the Elpeco Horn Gap Switches.

These are shown to exemplify the move toward better protection of operators, better protection of equipment —more accuracy in control.

In short . . . "for the good of the service."

*for the good of the Service* *L. P. Cox*

ELPECO

ELECTRIC POWER EQUIPMENT CORPORATION

412-420 NORTH EIGHTEENTH ST. PHILADELPHIA, PA.

Western Representatives: C. E. INGALLS, Rialto Bldg., San Francisco, Calif.; EICHER & BRATT, 570 Colman Bldg., Seattle, Wash.

Electrical West entered as second class matter at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published at 883 Mission Street, San Francisco, California, thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1 and December 1.

Volume 60 San Francisco, March 1, 1928 Number 3

# Electrical West

With which are consodidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

C. T. HUTCHINSON, *Editorial Director*
W. A. CYR, *Associate Editor*
G. R. HENNINGER, *Associate Editor*

A McGraw-Hill Publication
Established 1887

G. C. TENNEY, *Managing Editor*
E. J. KNOWLTON, *News Editor*
B. H. SNOW, *Northwest Editor*

## Contents

**Editorial** ..... 125
Growing Importance of Industrial Heating Load —The Inspector as an Adviser—Tolerance Will Bring Improvement in Trade Relations—Applied Public Relations for the Home-Maker —Rate Reduction in Northern California Holds Many Promises—Diagnosing an Ailing Motor Distribution Situation—Ripley Lecture Shows Power in a New Role.

**A Sierra Hydraulic Development** ..... 128
Frontispiece.

**Mono-Bear Diversion Important Step in Big Creek Development** ..... 129
By J. W. ANDREE.
The economics and operating possibilities of the latest step in the Big Creek development of the Southern California Edison Company are discussed in this article.

**Formulating a Definite Program of Farm Electrification** ..... 131
By J. C. SCOTT.
Some of the reasons for a definite farm electrification program, with the methods used and the principles on which it is based are here set forth by the head of the department of the Puget Sound Power & Light Company.

**Termite Pole Damage in California** ..... 135
By THOMAS E. SNYDER.
Having recently completed a survey of termite ravages in California one of the members of the U. S. Bureau of Entomology gives a resume of his observations together with comments on the various methods of protecting against the inroads of "white ants."

**Telling the Story of Electric Service to Women by Women** ..... 139
By RUTH E. CREVELING.
A discussion of the organization and functions of the Women's Committee particularly as it applies to improving the utility's position with the women of the community.

**Distribution of Electric and Radio Equipment** ..... 141
Surveys recently conducted by the Department of Commerce for the purpose of analyzing the distribution facilities of the country contain much of interest to jobbers and manufacturers. This article presents the results of the survey in Western cities with particular reference to electrical equipment and radio.

**Recent Industrial Heating Installations in San Francisco Bay Region** ..... 143
Industrial electric heating is making considerable progress in the Western states. Some of the most noteworthy recent installations in northern California are described in this article.

**Engineering Practice** ..... 146
Automatic Stations Checked via Telephone ..... 146
Transmission Towers Cleaned and Painted with Compressed Air Equipment ..... 148
Cable Splicers Use Motorcycle Cart for Transportation and as Workshop ..... 149
Analysis of Current Transformer Tests—X ..... 150
Preventing Sheath Wear on Large Cables ..... 152
Residence-Type Automatic Railway Substation ..... 153

**Ideas for the Contractor** ..... 154
Bargains in Convenience Outlets in Denver ..... 154
Never Too Old for Complete Rewiring ..... 156
Layout Builds Up the Wiring Job ..... 157
Developments in Electric Pumping ..... 158
Electric Ventilation for Garages, Factories and Spray Rooms ..... 160

**Better Merchandising** ..... 162
"See as You Enter" Refrigeration in El Paso ..... 162
Organized to Sell the Complete Electric Home ..... 163
Socket-Filing Campaign Succeeds ..... 164
Residence Kilowatt-Hour Contest Launched by N.E.L.A. ..... 165
Well Lighted Windows Serve as an Example to the Community ..... 166
Do You Try Reselling Old Accounts? ..... 168
Fixture Designs Employing Shaded Light ..... 169

**News of the Industry** ..... 170

**Contractors, Dealers and Inspectors** ..... 177

**Personals** ..... 180

**Meetings** ..... 182

**Manufacturer and Distributor** ..... 183

**New Equipment** ..... 184

**Industrial Barometer** ..... 186

McGRAW-HILL COMPANY OF CALIFORNIA—883 Mission St., SAN FRANCISCO
Northwest Office: 1206 Spalding Building, Portland, Ore.
Publishers of ELECTRICAL WEST

JAMES H. McGRAW, Chairman of the Board
C. T. HUTCHINSON, President
EDGAR KOBAK, Vice-President
ROY N. PHELAN, Secretary and Treasurer

WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, 1600 Arch Street
CLEVELAND, 401 Guardian Building
ST. LOUIS, Southwestern Bell Telephone Bldg.
NEW YORK, 285 Madison Avenue

McGRAW-HILL PUBLISHING COMPANY Inc.
New York

Publishers of

Industrial Engineering Electrical Merchandising
Chemical and Metallurgical Engineering Power
American Machinist Construction Methods
Electrical World Electric Railway Journal
Coal Age Engineering and Mining Journal
Bus Transportation Engineering News-Record
Radio Retailing Ingenieria International
American Machinist—European Edition
*(Published in London)*

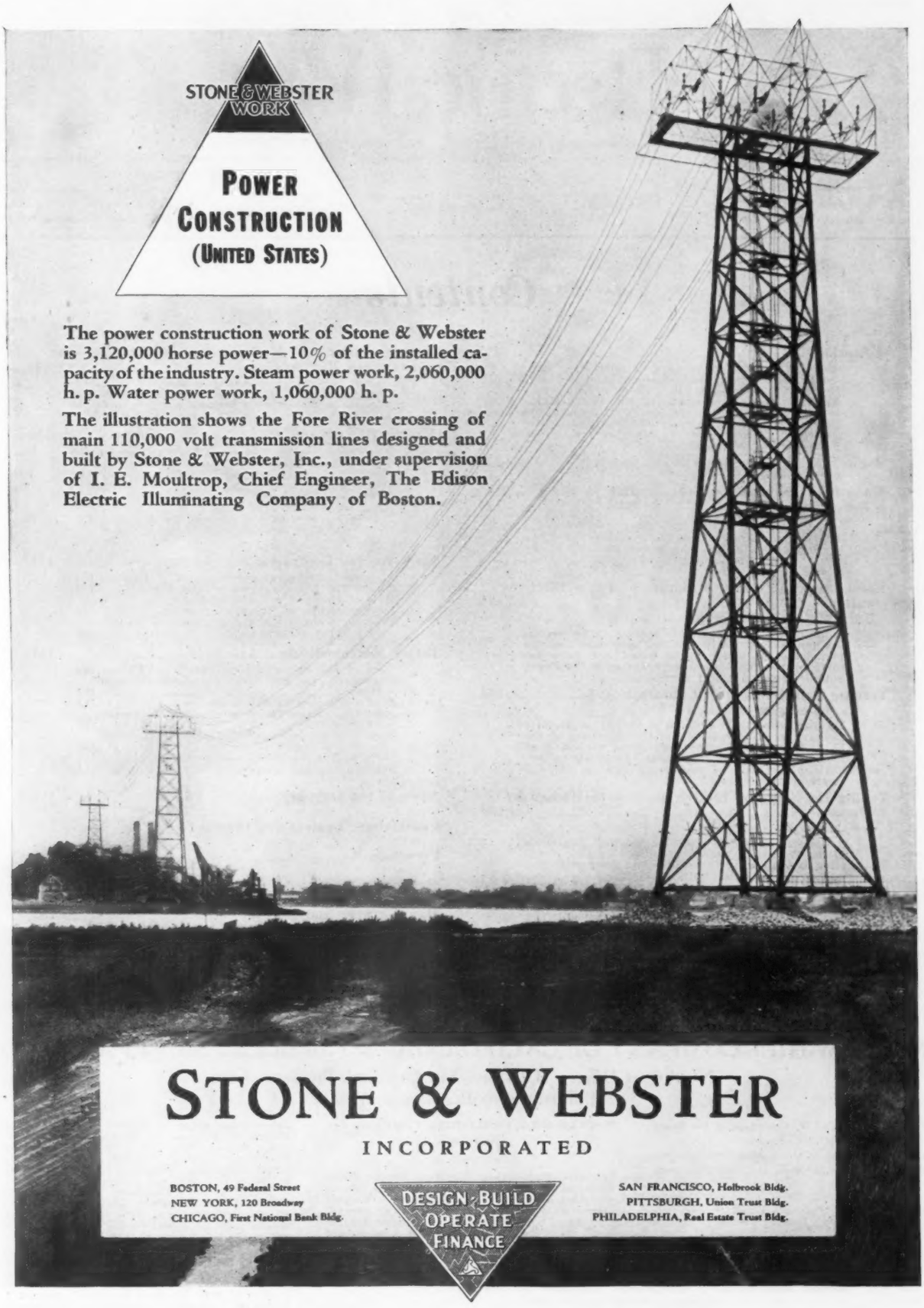
Member Audit Bureau of Circulations. Associated Business Papers, Inc.
Circulation of this issue, 6,400

Copyright, 1928, by McGraw-Hill Company of California

Subscription rates in United States, Canada, Mexico, Porto Rico, U. S. Possessions, Argentina, Bolivia, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Nicaragua, Panama, Guatemala, Paraguay, Peru, Honduras, Salvador, Uruguay, and Spain, $2.00 per year, 2 years, $3.00. Elsewhere $3.00 Gold (13 Shillings). Single copy, 25c. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Entered as second-class matter at the Post Office at San Francisco, under Act of March 3, 1879. Published thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1, December 1.

Printed in U.S.A.


STONE & WEBSTER WORK
POWER CONSTRUCTION
(UNITED STATES)
The power construction work of Stone & Webster is 3,120,000 horse power—10% of the installed capacity of the industry. Steam power work, 2,060,000 h. p. Water power work, 1,060,000 h. p.
The illustration shows the Fore River crossing of main 110,000 volt transmission lines designed and built by Stone & Webster, Inc., under supervision of I. E. Moultrop, Chief Engineer, The Edison Electric Illuminating Company of Boston.
STONE & WEBSTER
INCORPORATED
BOSTON, 49 Federal Street
NEW YORK, 120 Broadway
CHICAGO, First National Bank Bldg.
DESIGN · BUILD
OPERATE
FINANCE
SAN FRANCISCO, Holbrook Bldg.
PITTSBURGH, Union Trust Bldg.
PHILADELPHIA, Real Estate Trust Bldg.

# Electrical West

With which is consolidated the Journal of Electricity

C. T. HUTCHINSON
*Editorial Director*

A McGRAW-HILL PUBLICATION

G. C. TENNEY
*Managing Editor*

Volume 60 | San Francisco, March 1, 1928 | Number 3

## Growing Importance of Industrial Heating Load

INDUSTRY is turning to electric heat for the performance of many of the complex heating tasks that heretofore have been accomplished by solid, liquid or gaseous fuels. Among the manifold advantages responsible for this change are accurate temperature control, increased production, lower maintenance cost, increased productive ability of labor, elimination of the expense of storing, handling and firing fuel, superiority of product and lower heat losses. Combined, these advantages result in lower over-all costs in comparison with other types of heating equipment.

Elsewhere in this issue there is a discussion of some of the latest electric heating installations in the San Francisco Bay region. Successful applications such as those described are doing much to further the development of this load. In their sales activities the central stations can capitalize upon the publicity values of such installations in convincing other prospects for heating equipment of the practicability of electric heat. One of the most striking observations in visiting plants where electric heating equipment is in operation is the high praise paid the equipment by old-time furnace operators and foundry men. With industry receptive and with highly successful installations to refer to, there is every reason for central stations to devote considerable time and attention to the development of industrial heating.

## The Inspector as an Adviser

A RESOLUTION was offered at the convention of the Northwest Association of Electrical Inspectors in Seattle stating that the name "electrical safety supervisor" better expressed "the present true position of the inspector in the industry and in his relation to the public," and suggesting that the idea be given consideration. The resolution grew out of a remark in R. M. Boykin's address of welcome, which called attention to the stigma attached to the term "inspector," and though the resolution was tabled by being referred for further consideration to the executive committee, nevertheless the seed of a thought was sown.

It is true that the title "inspector" always has carried with it an unfavorable psychological effect on the mind of the hearer, because of the arbitrary and ofttimes arrogant attitude of inspectors in general. It is also true that a changed attitude toward the electrical inspector's job has been adopted by inspection departments in many quarters. Through far-sighted code-making, liberal code interpretation and sane code administration in many localities, the inspector has placed himself in the position of a helpful adviser on things electrical, and through this position has maintained a considerable influence on the advancement and development of the industry.

Someone has devised a picturesque simile with which to illustrate the transition from inspector to adviser. The inspector should consider himself not as the policeman snooping around dark alleys hunting for law violators, but as that same policeman taken off the beat and placed on a busy intersection to assist the citizenry to proceed about its business safely and quickly. In other words, if he is to be of the greatest possible service to his public, he should present himself as an adivser and director rather than as a sleuth. From this point of view, he should help the contractor to strive for a more complete wiring job rather than merely to compete for a price, and help the public to an appreciation of the value of such a job in making available a greater use of electric service with its accompanying benefits. Thus does the inspector elevate his position in the industry; thus does he perform a greater public service; and thus does he reflect credit on himself and his profession. Undoubtedly a change in designation would assist him in gaining recognition of his true worth in the eyes of the industry and the public.

## Tolerance Will Bring Improvement in Trade Relations

IT IS encouraging to note a constantly increasing tendency on the part of the power companies to take advantage of existing means of distribution in promulgating load-building campaigns. Extremists on one side of the fence would have the power companies merchandise appliances indiscriminately without regard to sound business practice, credits or installment-plan purchases, while those on the other side would deny to the power companies the privilege of doing anything at all to build load on their lines, leaving this responsibility wholly to established trade channels, such as the contractor-dealer and non-electrical outlets.

Obviously, neither viewpoint is correct; neither is equitable, and both are contrary to the public interest. Goods do not sell themselves, nor do ideas, and the concept of the all-electrical home is a growing idea that is rapidly receiving recognition from the people at large. Students of marketing know that any campaign for the establishment of an idea cannot but redound to the benefit of anyone who can contribute to that idea, even though those conducting the campaign plan it for their own interest.

It is not strange, therefore, that the extremists representing each school of thought as to the marketing of electrical appliances are nearing the center, as a common ground of compromise by which the interests of each are given due consideration and a better work is being accomplished for those who market and those who use electrical appliances.

A study of central station merchandising plans for the year 1928 presents a marked improvement that has taken place within the last few years. In fact, there is a spirit of live and let live expressed in it that promises well for the future. There are, and probably always will be, irreconcilables on both sides that will never be satisfied with anything less than having their own way in every respect, but it is believed that the great majority

of established dealers will join with the power companies and take advantage of the opportunity afforded by the impetus imparted to the electrical idea to tie in to their own advantage. That objectional features in some details will develop is most likely. No plan ever is so perfect that it cannot be improved. The sensible way is to watch for defects as they develop and then take steps to bring about their correction, not by declaiming one's grievances from the housetop or soap box, but by temperate discussion with those concerned.

By and large, the men of the electrical industry are an earnest, fair, hard-working lot, sincere in their efforts to do a good job in the right way, and anyone with a just and reasonable criticism can get a fair hearing. The apparent divergence of opinion with respect to load-building and merchandising is not so great but that all parties interested can be brought closer together through a calm and dispassionate discussion of the problems involved.

## Applied Public Relations For the Home-Maker

UTILITIES interested in methods of increasing goodwill may take with profit a lesson in public relations from the Market Street Railway Company of San Francisco.

Throughout the country it is the policy of H. M. Byllesby & Company, which controls the Market Street Railway Company, to take an active part in civic affairs and to co-operate toward the advancement of the common welfare of the communities in which it operates. A study of conditions made shortly after its entry into the San Francisco field revealed the fact that while the company had access to numerous channels of communication with the male population of the city, it was confronted by a blank wall as far as the women were concerned. The members of its staff did not know how the women of the community regarded the company and its service and they had no means of finding out.

So in the interests of women car riders and to effect a means of contact with them a woman's division was created and a woman, Miss Ruth Huntington, was placed at the head of it. Fifteen hundred letters announcing the creation of the division and its purpose were mailed out to club women on the theory that such women would be interested in the welfare of the community and consequently in the constructive work which the company was trying to do. The response was immediate, many of the women stating they were in hearty accord with the company's policy and expressing their pleasure that a public service corporation thus should accord serious consideration to the feminine viewpoint.

Many of these women's clubs have committees on safety work, and as the representative of a company dealing continually with safety and traffic problems Miss Huntington works directly with those committees in an effort to co-operate with them on safety measures. She seeks out the neighborhood organizations in the outlying residential sections and explains the policy of the company and the work it is trying to do. She invites their suggestions and criticisms in an effort to cause the criticism, if such there be, to be made direct to the company instead of allowing it to seethe unchecked and create bitterness against the company. These meetings have had very favorable results.

This contact with women's clubs is but one of Miss Huntington's activities. Another is the interviewing of all women callers at the offices of the company. In this way many valuable suggestions for the improvement of the service are received, which otherwise might have been lost, for it has been found that some women, timid about offering their suggestions to "busy company officials" will discuss them at length with a woman. Other women are pleased by the consideration which enables them to make to a woman complaints which in some cases it might embarrass them to discuss with a man.

Another part of Miss Huntington's duties is to keep in service the special car which the company has dedicated, primarily for educational purposes, to school children, shut-ins, war veterans and similar groups. This enables the head of the women's division to approach a club or other body of women with which she might have no other means of contact and say, "This car is at your service, gratis. In what way can you use it?" These invitations have resulted in beach picnics for poor children who had never seen the ocean, an excursion for grandmothers, an inspection of the company's woodworking shops by a class in manual training, other trips of a like nature—and a very real feeling of gratitude and friendliness toward the company.

The company does much good-will advertising, and the head of its women's division handles the placing of such matter in women's publications for the reason that she has a better knowledge of their value as media than have men.

These methods are being used with success by a street railway, and the increased good-will of the community toward the company has been noticeable. Since women are homekeepers, as well as car riders and club members, and deal daily with the problems of lighting, heating and cooking, are there not ideas here that could be used to good advantage by central station companies?

## Rate Reduction in Northern California Holds Many Promises

"SAY IT with low rates, and when you do say it, say it so effectively, so loudly that every household in the land will hear." Such was the sound advice given the industry by B. C. Forbes at the 1927 National Electric Light Association convention at Atlantic City. "The public will not be satisfied merely by punctilious courtesy, affable attention to complaints, fine-sounding speeches or other statements, rosy promises or any form of airy flattery. Nor will the public be satisfied by better performance in the way of service, even faultless service. All your public relations activities, all your demonstrations of brilliant efficiency, all your achievements in the direction of interconnecting and merging far-flung properties will not long suffice to gain and maintain public and political good-will unless you prove yourselves able, willing and anxious to *say it with lower rates.*"

Mr. Forbes was speaking from a public relations standpoint. When the Pacific Gas and Electric Company, the Great Western Power Company and the San Joaquin Light & Power Corporation announced their decreased residential and commercial rates during the past month, load development as well as increased public good-will were undoubtedly the motives.

The possibility of increasing consumption by appropriate rate reductions has become almost universally recognized by the leaders of the industry. Mass production has necessitated mass selling. Henry Ford proved beyond a peradventure of a doubt that the way to achieve mass sales was to put a low price with a small profit on the product to be sold.

Experience in other sections of the country where marked reductions in residential rates have been made

has proved that any immediate loss in revenue is more than made up within a few months by the increased use of energy by the consumers. Surveys over a large section of the country show an average annual domestic consumption of 194 kw.-hr. where rates were 13 to 19 cents; 339 kw.-hr. where rates were 7.1 to 8 cents; and 1,171 kw.-hr. where rates were 1 to 3 cents. On the basis of these results a material increase in consumption may be expected in the territory affected by the new rates of the three northern California companies.

While it would appear that the public would be the greatest benefactor from the new rates, the industry itself will benefit to a marked extent. The new rates should still for all time the voices of various municipal ownership advocates in the territory. The chief advantage that these advocates had to offer to the voting public was lower residential rates. Few municipally owned utilities can show rates better than those that will be in effect in northern California.

However, the greatest benefit to accrue to the entire industry will be the increased market for domestic appliances. The old excuse of the customer that a certain appliance "costs too much to operate" will no longer be a major sales resistance. The majority of convenience-outlet appliances used in the home will be on a 3½-cent rate while heavy-duty appliances will earn a 1½-cent rate. Such rates should gladden the hearts of the merchandising elements of the industry, particularly the manufacturer, the jobber and the dealer.

One word of warning might be offered with respect to the lower rates. The public will not voluntarily use more energy simply because rates have been reduced. The reduction must be merchandised just as any appliance is merchandised. While this educational campaign is primarily a task for the power companies, every other member of the industry that is affected will profit if he will lend his voice to the general publicity campaign. With all branches of the industry capitalizing upon its possibilities, the rate reduction can be made the biggest event in the history of the industry in northern California.

## Diagnosing an Ailing Motor Distribution Situation

AUTOPSIES are performed, as a usual thing, after the patient has died, when it is too late to do anything about it. If the results are of interest to the relatives the examining physicians close up their little black bags and make out a report. The report may or may not be incriminating, according to whether the reader thereof can understand the medical terminology. Then the corpse is turned over to an undertaker for a decent burial.

An autopsy—really nothing less than a critical analysis—of a living, if somewhat ailing patient, has more merit to it. If there is anything which can be done to save the patient it should be undertaken before it is too late.

Motor distribution, from the standpoint of the motor dealer at least, was felt to be in need of just such an examination. Rather than wait until the patient died these motor dealers called for a consultation on the case and invited the motor manufacturers' representatives to examine the patient, to whom they were both related by blood, with them. The State Motor Section meeting of the California Electragists, held at Fresno last month, was the clinical occasion in question.

Motor dealers and specialists set forth logically their opinions as to the causes for the ailments of motor distribution. The chief focal point of infection, they claimed, was the vague and loose classification of buyers entitled to discount in the purchase of motors and motor accessory equipment. It was maintained by these dealers, whose investment in repair and rewinding equipment is a safeguard of service performance to the customer from the motor manufacturer, that no industrial customer who does not buy motors for the express purpose of incorporating them as an integral part of some machine under manufacture, should be given discounts on motors which he is to use himself. All incentive to sell motors or to promote the retirement of obsolete motor equipment by the sale of new, they claimed, was taken from the dealer when motor manufacturers, in order to get the business from competitors, by-passed their own franchise holders and sold motors to industrials direct, granting the latter the discounts to which only dealers were entitled and wrecking the market price of motors.

Motor manufacturers' representatives then were asked for their diagnosis of the situation. They were not in a position to determine policy for their companies, they declared, but agreed that the situation was serious and that it needed adjustment. They offered salesmanship as a cure for many ills, and service as a sales advantage which the dealer-specialist could offer in his competition with manufacturers themselves. They promised also co-operation with their motor franchise holders in return for loyalty to their products.

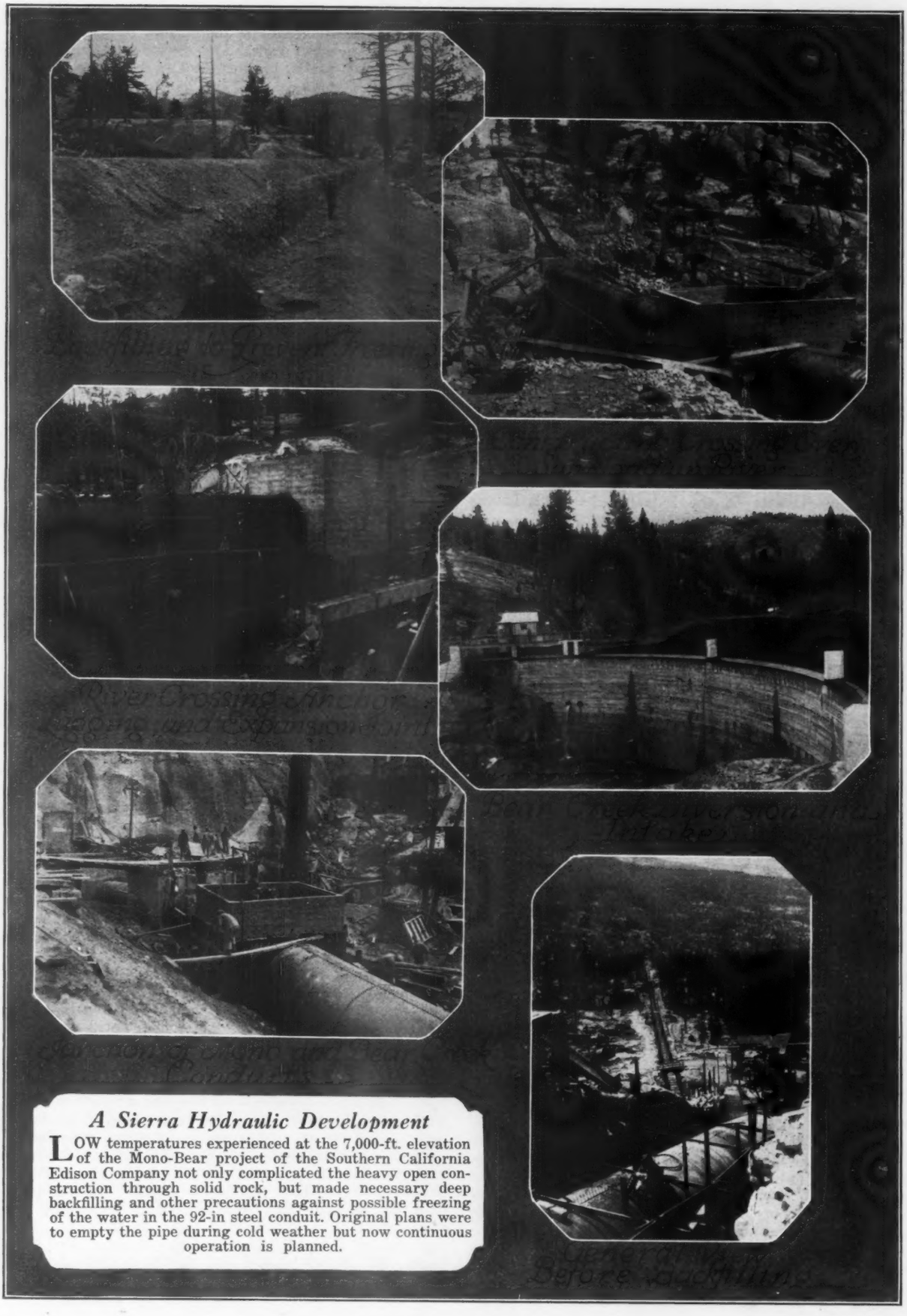
Out of this consultation, however, has come a better understanding of the problems of the dealer and manufacturer on the part of each. The Motor Section in its report gave evidence of an appreciation of the motor manufacturers' requirements and based its diagnosis upon that appreciation. Similarly the representatives of motor manufacturers evidenced an understanding of the sales problems of the motor dealers which promises support in their efforts to obtain a more equitable and better defined policy.

The word "co-operation" is apt to become tiresome if it is glibly flung about without meaning anything definite. The Motor Section of the Electragists, in this instance, is to be commended upon the fact that it molded into concrete form those bases upon which it hopes to co-operate with and to receive co-operation from the manufacturers of motor equipment.

## Ripley Lecture Shows Power in a New Role

ELECTRICITY'S contribution to American progress and prosperity is being ably and forcibly presented before gatherings of business men, utility employees, colleges and labor organizations by Charles M. Ripley of the General Electric Company, who is touring the country under the sponsorship of the Public Relations Section of the N.E.L.A. Mr. Ripley, through keen observance during his travels about the world, is able to show by comparison the differences between American and European standards of living particularly as applied to the laboring class. The American worker, he points out, has three times more horsepower in electric motors at his command than has his English counterpart. As a result his productive ability is thrice greater and his earning power is increased accordingly.

Despite the fact that his lecture graphically deals with such mundane things as the effect of the use of power on production, wages, purchasing power and standards of living, his wide experience, engaging personality and ready wit add a charm that well fits the title, "The Romance of Power." Those in the industry who have heard Mr. Ripley should feel fortunate indeed, while those in the cities where he is yet to visit should not miss the opportunity of listening to his message.



## *A Sierra Hydraulic Development*

LOW temperatures experienced at the 7,000-ft. elevation of the Mono-Bear project of the Southern California Edison Company not only complicated the heavy open construction through solid rock, but made necessary deep backfilling and other precautions against possible freezing of the water in the 92-in steel conduit. Original plans were to empty the pipe during cold weather but now continuous operation is planned.

# Mono-Bear Diversion Important Step in Big Creek Development

By J. W. Andree

Production Engineer, Southern California Edison Company, Los Angeles.

MONO-BEAR diversion on the Big Creek-San Joaquin River project of the Southern California Edison Company, placed in operation Nov. 20, 1927, marks the completion of another step in this important hydro-electric development. In this link the waters of Mono Creek and Bear Creek are diverted into the Florence Lake tunnel at a point about four miles from the tunnel entrance at Florence Lake.

**COMPLETION of the Mono-Bear diversion works and the Shaver Lake dam brings under control an additional 193 sq. miles of drainage area and provides an additional 132,000-acre-ft. storage for the high-head plants on Big Creek. Mr. Andree gives an interesting insight into the economics and operating possibilities of this undertaking.**

The drainage area of the Florence Lake diversion is 176 sq. miles and that of the Mono-Bear diversion is 139 sq. miles. Thus the total drainage area supplying water through the Florence Lake tunnel is increased about 80 per cent by this new diversion. The total drainage area of the whole Big Creek-San Joaquin project is approximately 1,200 sq. miles, of which 39 per cent is fully developed. Even now the water from the whole drainage area is used through power house No. 3 except during the flood period in which some water is spilled past this plant. When the project is fully developed, and the No. 3 plant completed to its ultimate capacity no water will be spilled past this plant at any time, except possibly during maximum flood periods of years of exceptionally heavy precipitation.

Mono Creek and Bear Creek are situated on the opposite side of the South Fork of the San Joaquin River from the Florence Lake tunnel, and drain into this stream several miles below the Florence Lake dam. The Mono-Bear diversion consists essentially of a diversion dam on each of these streams plus a conduit to a common point on the east slope of the South Fork of the San Joaquin River, and from that point an inverted sipon crossing this stream and discharging into an adit of the Florence Lake tunnel.

The Bear Creek conduit is a 7 x 9-ft. tunnel 7,695 ft. in length, while the Mono Creek conduit consists of 4,361 ft. of 92-in. steel flow line plus 3,450 ft. of 7 x 9-ft. tunnel. These conduits are connected to the siphon by means of a 102 x 84 x 72-in. steel "Y." The sipon is of riveted steel 13,617 ft. long and varying from 102-in. diameter at each end to 75-in. at the middle.

The lowest point on this siphon is 625 ft. below its upper end and is subjected to an operating head of about 595 ft. At the discharge end of the siphon is a 102-in. butterfly valve operated by a gas engine. With this valve closed, the lowest point on the siphon will be subjected to a hydrostatic head of 775 ft.

For years of normal rainfall, the runoff from the Florence Lake and Huntington Lake drainage areas is sufficient to fill these two reservoirs and the water thus made available for power production is sufficient to keep fully loaded the existing chain of plants as far as is permitted by the daily system load factor. Therefore, co-incident with the completion of the Mono-Bear diversion it was necessary to provide both additional storage capacity and additional plant capacity. Unfortunately, water storage sites are not plentiful in this precipitous mountain region, and it was not considered feasible to increase the storage capacity of Huntington Lake or Florence Lake.

Shaver Lake, however, offered an excellent reservoir site. Hence a 132,000-acre-ft. reservoir has been constructed there and power house No. 2A, which will be completed by July, 1928, in time to utilize this year's run-off, will take the water from Shaver Lake with a 2,417-ft. drop and discharge it into the existing tail-race of power house No. 2. A tunnel now under construction and to be completed by May 1, 1928, will conduct water from Huntington Lake to Shaver Lake. The waters of Pitman Creek also are to be diverted into Shaver Lake via this tunnel. There is a power drop of approximately 1,300 ft. between the lower end of the tunnel and Shaver Lake, which eventually will be utilized by the proposed power house No. 1A. This will be a low-load-factor plant and its construction under present cost and load conditions is not warranted. Hence, for the immediate future, water will be discharged from the end of Huntington-Shaver Tunnel into the North Fork of Stevenson Creek and will follow the course of this creek into Shaver Lake.

Big Creek No. 2A, a 90,000-kw. plant, will draw its water directly from Shaver Lake, and will require about 625 sec.-ft. for full load. Plant No. 2 uses 575 sec.-ft. for full load. Thus there will be available 1,200 sec.-ft. of water for power house No. 8, which, however, is developed only for use of 500 sec.-ft. at the present time. An additional 35,000-kw. unit is scheduled for operation in plant No. 8 by July 1, 1929. This will provide sufficient capacity to utilize all available water at that point. Because of the large block of energy made available by power house No. 2A and the effect of that block upon the power requirements of the territory served, the load factor on the additional unit at power house No. 8 is sufficient to give this unit an output, the value of which does not exceed its fixed charges and operating costs, until after July 1, 1929.

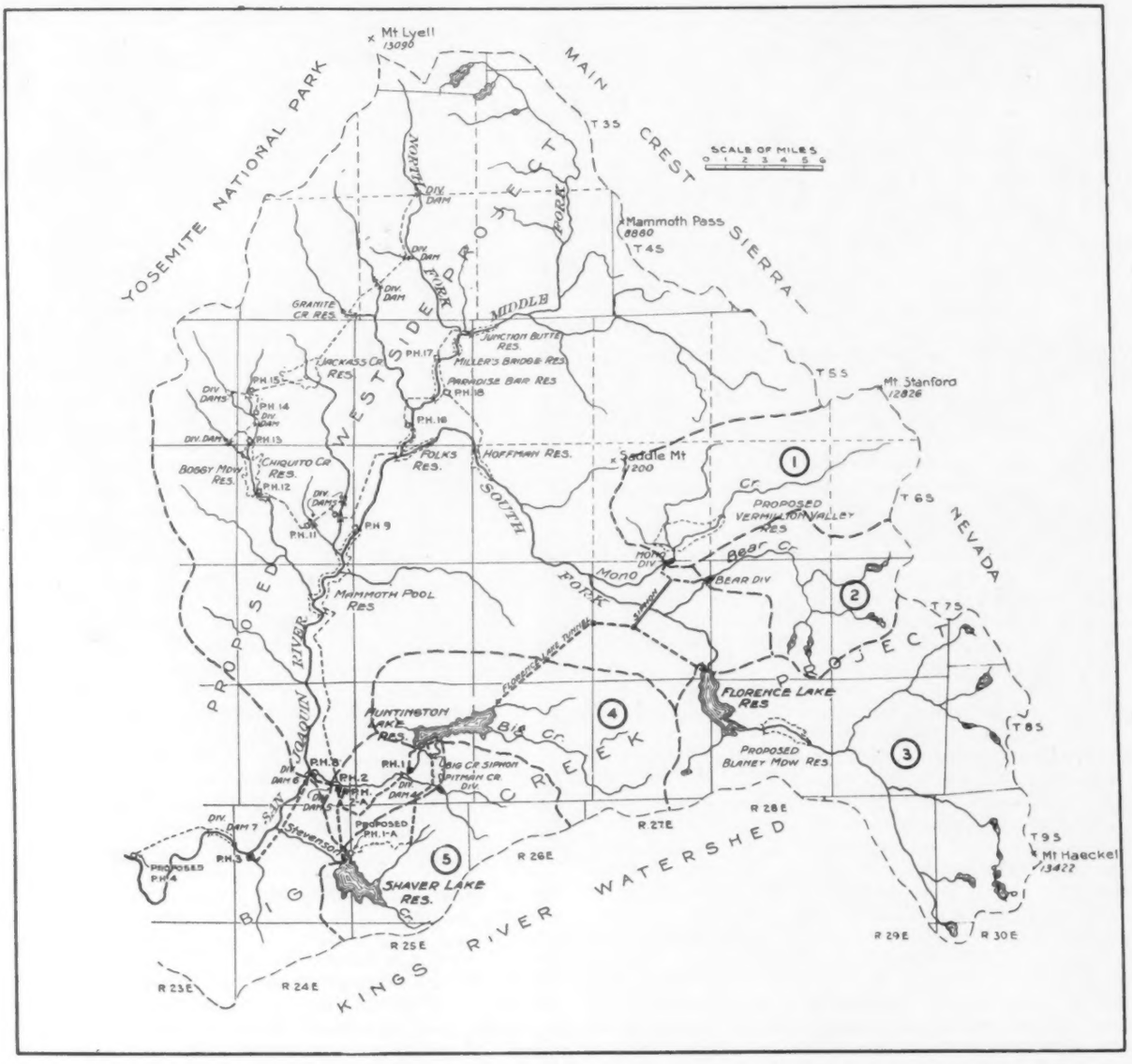
Big Creek No. 3 plant which receives its water from the tail race of power house No. 8, and in addition utilizes the flow from the entire watershed, has a capacity at present sufficient to use a maximum of 1,600 sec.-ft. During a six months period of each year the stream flow of the uncontrolled watershed is less than 400 sec.-ft. Therefore during that period no water will be wasted past the No. 3 plant. There is about 800 acre-ft. of usable storage capacity in the reservoir at the intake to the No. 3 plant which is invaluable in reducing spill. An additional 25,000-kw. unit is scheduled for operation at No. 3 plant July 1, 1930. Preliminary

work now is being done on power house No. 4, a 40,000-kw. plant to be located on the main San Joaquin River just below power house No. 3. The No. 4 plant probably will not be completed before 1931.

The average annual run-off of the Mono-Bear watershed is 182,000 acre-ft. About 20 per cent of the annual run-off occurs from Aug. 1 to April 1, a period during which storage water is being drawn upon. Hence during this period the run-off from this watershed will be utilized through the entire power drop (plants Nos. 1, 2 and 8) from the level of Huntington Lake to the tailrace of power house No. 3. About 80 per cent of the run-off, however, will be transferred from Huntington Lake to Shaver Lake, utilizing only the power drop below the level of Shaver Lake (plants Nos. 2, 8 and 3). For years of sub-normal run-off the percentage of the run-off from Mono-Bear watershed which will be used through the entire power drop will be much larger and for years of extreme drought, such as the season of 1924, the entire run-off from this watershed may be utilized without diversion into Shaver Lake. For years of more than average precipitation the run-off from these upper watersheds will more than fill the reservoirs now constructed. It is planned, therefore, to construct two more reservoirs for storing this water, one at Vermillion Valley on Mono Creek, a short distance above the present Mono Creek diversion dam, and another at Blaney Meadows on the South Fork of the San Joaquin River above Florence Lake.

When water is carried over from one season to the next, such carry-over will be done at Shaver Lake because of the greater power producing value of the water from the higher elevation reservoirs.

Normally, Big Creek No. 1 and No. 2 will be operated to full load before any load is put on Big Creek No. 2A. Hence plant No. 2A will operate at a lower load factor than plant No. 1 or 2. During years of sub-normal precipitation the water in Shaver Lake probably will be conserved for peak capacity and regulation. The No. 2A plant will be operated to regulate the system speed, while economical block loads are carried on Nos. 1 and 2, and the most efficient steam generating units.




Map showing the relation between Mono-Bear diversion and the balance of the Big Creek project of the Southern California Edison Company. (1) Mono Creek watershed, and (2) Bear Creek watershed, total area 139 sq. miles. (3) Florence Lake watershed, 176 sq. miles. (4) Huntington Lake watershed, 79 sq. miles. (5) Shaver Lake watershed, 54 sq. miles.

A poultry farm near Puyallup, Wash., where electricity is playing a feature role.

# Formulating a Definite Program of Farm Electrification

By J. C. Scott

Agriculturist, Puget Sound Power & Light Company, Seattle, Wash.

THE Puget Sound Power & Light Company long has served a large number of customers outside the corporate limits of cities and towns served by it. The greater portion of these are in the western Washington territory from north of Bellingham to the southern limits of the company's territory south of Kelso. Some 5,000 such customers were added in the year 1927, bringing the total up to about 40,000. It is estimated that at this time the company serves 75 per cent of the available customers outside the towns and cities. Of course many of these customers are not strictly speaking farmers, but on the other hand a great many are, so that it will be seen at once that the company has had on its hands a farm electrification problem of sizable proportions.

**ADDING rural customers at the rate of 5,000 annually and developing the farm load intensively to make them profitable is becoming a major problem of the Puget Sound Power & Light Company. Some of the reasons for a definite farm electrification program, with the methods used and the principles on which it is based are here set forth by the head of the department.**

The reasons for considering this a major problem are that the company believes that a more prosperous agriculture will make for more prosperous cities and towns which will have its favorable effect on the company's urban business, and that intelligent application of electric power to farm operations will increase production or decrease costs thus making agriculture more prosperous. The problem has two principal aspects: that of extending lines to take on additional numbers of farms, and that of intensively developing the business already secured through fostering a larger use of electricity in a way that will return a profit to the farmer for the cost of the additional energy used. The first aspect of the problem was partially solved by the line extension rules for Washington put into effect by the state Department of Public Works. But of course it is readily seen that the greater the use that could be sold to new farm customers, the greater would be the revenue from the extension and the less would be the advance payment required. Consequently the easier it would be to secure new business and the better would be the satisfaction of the new customers. The corollary to this is that the greater the diversity that could be secured on the farms, the better the load factor or rural business and the greater the profit from the rural lines.

With the idea, then, of seeing what could be done toward intensive development of the farm load, the company installed about two years ago a rural service department. After two years' experience the company has come to certain conclusions and has adopted a definite plan for developing this business which it will be the purpose of this article to set forth.

## Farm Load is Desirable

Having overcome scepticism from some quarters, it is believed now that a farm load in western Washington, if properly developed, is a desirable load for the company. It has been argued that many farm operations such as brooding or incubating are of short seasonal duration, which is true, but it is likewise true that on farms on which such uses can be applied, other seasonal

or year-round uses can also be applied to the economic benefit of the farmer, so as to produce a fairly steady year-round utilization. To understand this it is necessary to know that the agriculture of western Washington is well diversified. Poultry raising and dairying are the leading industries of agriculture, but some of these farms likewise engage in other farm production, and there is a considerable acreage devoted to small fruits, truck farms, hay, grain and stock raising. Thus an example of a balanced rural load of seasonal uses in this territory, which if fully developed would benefit the company as well as agriculture, is somewhat as follows:

Winter—Lights in laying houses, barns and barn lots; heating drinking water for stock.

Spring—Incubators and brooders; electrically heated hot bed.

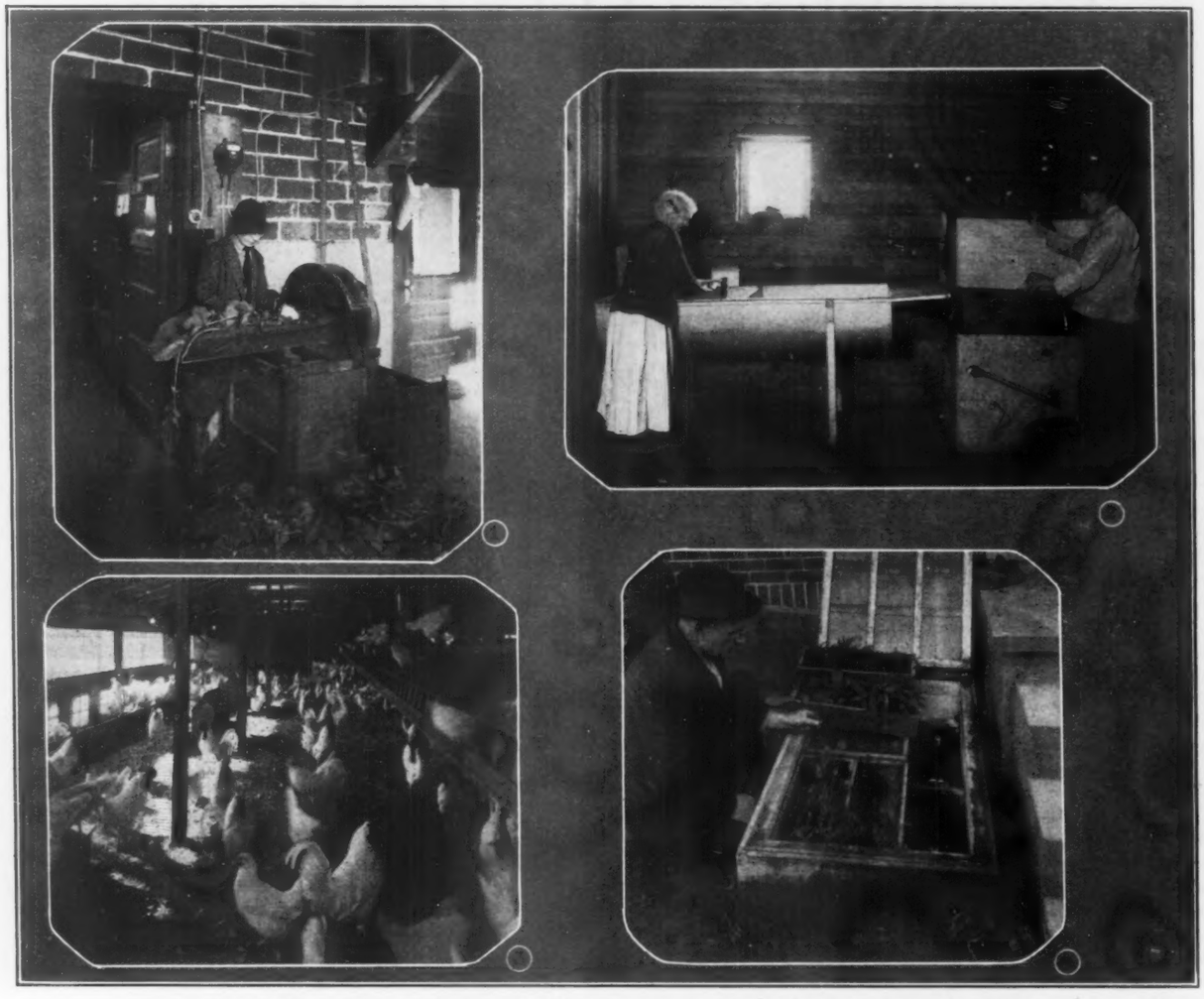
Summer—Irrigation.

Autumn—Utility motor for sawing wood, grinding feed, filling the silo, threshing and hoisting hay.

There are many year-round uses of electricity on the farm that have been found profitable to the farmer, and that, if developed along with the seasonal uses, will straighten out the load curve and improve the load factor on the rural lines. Some of these are: dairy sterilizer, electric milking machine, domestic water system, cream separator, churn, shop motor, and all the household appliances. No one of these uses, it is true, will yield a large revenue, but each forms a step in any comprehensive and complete farm electrification program that will be profitable to the company.

Table I gives a list of the more common farm operations where, demonstrably, electricity can be used to advantage by the farmer in western Washington. The data on average connected load and the average energy consumption have been taken from reports of state committees on relation of electricity to agriculture, from tests made by state agricultural experiment stations, and from observations made by the company of actual field operations.

These, as has been stated, are only some of the more common uses on which considerable data have been gathered. Many other uses, the economic value of which to the farmer has already been partially proved, could be cited. Literally dozens—one could almost say hundreds—of uses are under experiment by the various state committees on relation of electricity to agriculture or agricultural experiment stations, and the results of all such experiments and investigations are eagerly awaited. Some of the prospective uses on which complete or additional information is desired are: on certain improvements in electric incubating and brooding, on



WHERE ELECTRICITY LIGHTENS LABOR, CUTS COSTS, OR INCREASES PRODUCTION

(1) A 2-hp. motor attached to a green feed cutter saved 80 per cent of the cost of cutting the same feed by hand. (2) Labor was saved and containers kept sanitary by the use of a bottle washer and a De Laval electric sterilizer on this dairy farm. (3) Egg production was increased by electric lighting in this laying house. (4) Electric heat applied to hotbeds has taken some of the guess work as well as much of the labor out of the nursery business.

A dramatic illustration of the effect of electric pumping on production. These strawberry fields were located side by side near Edmonds, Wash. The one on the left was irrigated, the one on the right was not. The pictures were taken the same day.

**Table I—Common Farm Operations Where Electricity Can Be Used Economically**

| Operation. | Average Connected Load | Energy Consumed |
|---|---|---|
| Lighting | 500 watts | 18 kw.-hr. per mo. |
| Range | 7 kw. | 125 kw.-hr. per mo. |
| Water pump (household) | ½ hp. | 16 kw.-hr. per mo. |
| Refrigeration (household) | ¼ hp. | 50 kw.-hr. per mo. |
| Milking | 2¼ hp. | 2½ kw.-hr. per cow per mo. |
| Separating cream | ¼ hp. | 1.1 kw.-hr. per 1,000 lb. milk |
| Threshing | 7½ hp. | 26 kw.-hr. per 100 bu. |
| Feed grinding | 7½ hp. | 6 kw.-hr. per ton |
| Water pump (live stock) | 1 hp. | .2 kw.-hr. per 100 gal. |
| Milk cooling, storing and making ice | ½ hp. | 7 kw.-hr. per cow per mo. |
| Filling silo | 15 hp. | 2.4 kw.-hr. per ton |
| Lighting dairy | 500 watts | 20 kw.-hr. per mo. |
| Irrigation (10 acres, ave. 6 hr. per day during season) | 3 hp. | 403 kw.-hr. per mo. |
| Water heater and sterilizer for dairy utensils (2 hr. per day all year) | 3.5 to 5 kw. | 210 to 400 kw.-hr. per mo. |
| Incubator (600-egg size, 3 weeks per hatch) | 290 watts | 60 kw.-hr. per hatch |
| Brooder (500-chick size, 6 weeks per brood) | 800 watts | 270 kw.-hr. per brood |
| Grinding, mixing, chopping and elevating feed for 2,500-hen poultry farm (2 hr. per day all year) | 5 hp. | 224 kw.-hr. per mo. |
| Lighting poultry house (2,500 hens, 3 hr. per day for 6 mo. in year) | 1,875 watts | 169 kw.-hr. per mo. |
| Candling eggs | 100 watts | |
| Electrically heated hotbed (3 x 6 ft.) | 100 watts | 72 kw.-hr. per mo. |

electric fans for forced ventilation in poultry houses, on electric baby chick nurseries, on electric heat for dehydration, on the electric hotbed, on the effect of the ultro-violet ray on stock and stock feeds, on the use of Cooper-Hewitt lights, on electric plows and cultivators, on electro culture applied to plants, on electro treatment of seeds, on the application of irrigation to many crops, and on the many possibilities of the utility motor. As fast as data are released by the investigational bodies they will be applied to conditions in western Washington, and, if it seems economically feasible, the use thus proved will be promoted among the farms served to add its bit to the diversified development undertaken by the company's rural service department.

Illustrative of the possibilities for revenue building among the farm customers, the following example is cited of two similar farms of equal size lying contiguous to each other near Puyallup, Wash. On one of these the annual bill for electric service has been about $20 for several years. On the other, due to the progressiveness of its owner and his susceptibility to well-applied salesmanship, the anuual bill has been increasing steadily until in 1926 it was $208.10. The addition of a wet-mash mixer during the past year will bring his 1927 bill up to around $250. This farmer is making money and is well satisfied with his use of electric service. Another one of the larger farm customers near Puyallup paid the company $553.03 in 1926, and is still in the market for additional crop-producing or labor-saving devices operated by electricity, as soon as he can be sold on their economic application to his problem.

### Farm Electrification is Programmed

In its experience with the attempt to develop rural business the company has formulated a fairly definite policy of promotion. Starting with the premises that as nearly continuous service as is possible to deliver should be maintained on rural lines and that sympathetic attention to the farmers' problems by trained specialists is desirable for maximum results, this program contains thirteen planks, which will be discussed briefly in turn.

*Farm Rate.* A rate for electric service on the farm, made to fit farm conditions and farm practices, is of first importance. This rate should encourage a diversified use and place no severe penalties on connecting and disconnecting seasonally used equipment. A desirable rural load must be made up of many intermittent short-time uses, and the rate should be so constructed as not to penalize the farmer desiring to use a 5-hp. motor for two or three scattered months during the year by requiring a demand charge for the months it is inactive. The rate should be simple, readily understandable and capable of being compared favorably with other rates.

*New and Improved Equipment and Machinery.* There is a crying need for suitable equipment and machinery to be electrically operated so that more manual labor can be electrified and so that costs of other forms of energy can be reduced. This is primarily a function of the manufacturers working in co-operation with state committees on relation of electricity to agriculture, but the company should stand ready to lend its engineering assistance to experiment and trial. The Puget Sound company has been called in consultation many times to assist in devising apparatus to perform certain operations, and has actually had a major part in developing a satisfactory brooder, an oat sprouter and a hotbed, as well as other devices improvised for specific needs.

*Demonstrations.* After a new appliance or method

has been worked out, the company should endeavor to get one example of it in operation to use as a demonstrating model to help sell others on its feasibility. Such demonstrations have proved very valuable in getting new uses started, but care should be exercised to see that the demonstration is in the hands of one who is sold on its value and workability.

*Company Personnel Familiar with Program.* It is essential that every one in the organization be familiar with the rural electrification program so that there will be thorough co-operation. In addition, those salesmen in rural territories who come much in contact with the farmers should familiarize themselves with the farmers' problems and utilize this intelligence in selling rural power. City selling methods are seldom successful. Preferably, the duty of keeping informed on farm uses of electricity should be detailed to one such man in each district in which there is any concentration of farmer customers, and he should know the mechanical and electrical operation of the equipment and understand what it is supposed to accomplish.

The fact that the company should co-operate with committees on relation of electricity to agriculture, experiment stations and other fact-finding bodies has already been mentioned. The Puget Sound company has been able in many instances to observe the operation of certain equipment, as for instance the stationary spray plant in the Wenatchee Valley, and gather valuable operating statistics and cost data to be utilized in C.R.E.A. reports and university bulletins. It is just as essential to know and keep contact with county agricultural agents, so as to keep these men informed as to the cost of certain operations by electricity. Such agents, uninformed, have been known to get an erroneous idea about the operation of a piece of apparatus and innocently give out misinformation about it to farmer enquirers.

*Programs for Farmers' Meetings.* Talks made before granges and farm meetings are very effective in the general scheme of popularizing electrical uses on the farm. The company should stand ready to furnish an entire program for such meetings, and in this connection motion pictures are extremely helpful. In 1927 the company put on the entire program or assisted on the program of thirty-nine meetings.

*Moving Pictures.* As above mentioned, moving pictures are always an adjunct to a farm meeting program. To provide these for this and other promotional purposes the company proposes to take motion pictures of a variety of farm operations.

*Farm Booklets.* Farm booklets containing descriptive material on different uses, with some cost data, instructions regarding use and accounts of actual operations can be made a very effective medium of spreading information. The company has issued two of these, one on poultry raising and one more general in scope, which have been distributed direct by mail and handed out at county fairs. A new book containing a wealth of new information is contemplated.

*Advertising.* Newspapers, farm journals and magazines, and town billboards are excellent media for advertising the use of electricity to the farmer. The appeal should be made on the basis of how electricity can be used to produce larger and better crops, or reduce manual labor or cut costs, or otherwise bring to the farmer the things he selfishly wants. Advertising in farm magazines should be regular and continuous, a small space in every issue being preferable to a large space used intermittently. This phase of the company's program, and the next pertaining to news and feature stories, are more fully explained in an article in the November, 1927, issue of ELECTRICAL WEST.

*News and Feature Stories.* The farm journals are always glad to publish stories about successful methods applied on farms, and in the comparatively new field of electrical applications lies a wealth of material from which interesting stories of this kind can be written. When these stories are honestly written about actual operations by a certain farmer, they form a most effective means of spreading the information. A form particularly acceptable to the reader is the interview form, in which the farmer—a man just like the men you are trying to reach—tells in his own words his satisfactory experience with the use of electricity for a certain operation. During 1927 the company secured the publication of such articles in the farm papers circulating in its territory to the extent of almost 50,000 words. The practice will be continued.

*Fairs.* The company's annual exhibit for the past few years at the Western Washington Fair, Puyallup, has proved an effective way of introducing new farm uses of electricity to large numbers of farmers from over the entire western part of the state who annually visit this fair. Certain permanent exhibiting equipment has been built and is used yearly, and each year new equipment is added. The practice of exhibiting in this fair, because of the large attendance of farmer customers, will be continued, but the value of participating in small county fairs is doubtful.

*Civic Activities.* If chambers of commerce and service clubs in small towns deriving a large percentage of their patronage from the farming element surrounding them can be made to understand that they should expend at least a part of their effort on helping the farmers already settled in the community instead of attempting to get more new settlers to compete with those now supporting the town, then such chambers and clubs can be made an important adjunct to a rural electrification program. The Puget Sound company has been successful in interesting a few chambers of commerce in its territory in the welfare of the existing farmer and believes that continued activity in this field will not only help the farmer to a more assured condition of prosperity but also will make the territory grow faster and produce a better feeling between the town and country, all of which will redound to the advantage of the company in the long run.

*Public Relations.* There is a definite relation between the public relations department of a company and any program of development the company undertakes. Obviously the program of development prospers better under conditions in which the company's relations with the public are satisfactory. The converse is also true—that the program of development if it makes for satisfied prosperous customers has its definitely favorable effect on the company's public relations. But beyond cognizance of the fact that this relationship exists, the rural development program should not attempt to encroach on the functions of the public relations department. In its talks, its advertising and its other publicity the development program should studiously avoid discussion of controversial matters, and should refrain from casting reflection on any other business or service. It should maintain a consistently constructive attitude and exercise all its energy in delivering the best possible service to the customers and prospects.

Using the above methods and following the above principles the rural electrification program of the Puget Sound Power & Light Company is going forward. It is recognized that only a small start has been made, but recent years' progress has been gratifying, and has revealed the remarkable possibilities in the field which can be attained only by applying a steady effort along a definitely charted course.

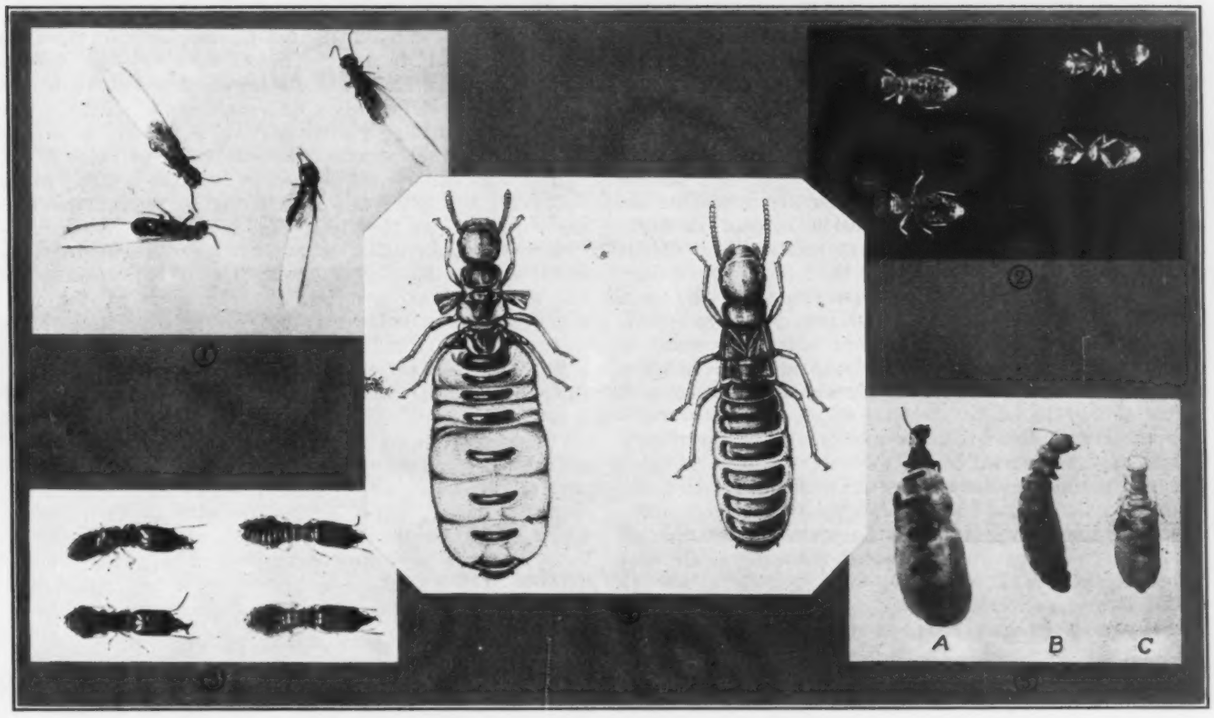



Fig. 1. (1) Sexual winged adults of the subterranean termite, a colonizing form which once a year "swarms" or progresses to new fields. (2) Ant-like worker of the subterranean termite, dirty-white in color, blind, the destructive wood-boring form of the insect, always remaining hidden in the wood. (3) Soldier type of the subterranean termite, for defense against the true ant, the termite's worst enemy. Usually remains hidden in the wood. (4) Greatly enlarged view of queen and king type of subterranean termite. These forms develop from the winged sexual adults, the queen becoming very large and having a high egg-laying rate. A king and queen may live together in a certain cell for as long as 25 years, but unlike the other members of the colony they can move about to new quarters at will. (5) Queen developed from winged sexual adult (*A*), a normal type; a single male and female head the colony. Queen developed from nymph-like form (*B*), a form that migrates only through the earth when out to start new colonies, has only wing-pads. Worker-like apterous form (*C*) with neither wings nor wing-pads, polygamous, migrates through subterranean channels. Reproductions are not life-size.

# Termite Pole Damage in California

By Thomas E. Snyder

Entomologist, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

**HAVING recently completed an extensive personal survey of the termite ravages in the California area, Dr. Snyder, widely know entomologist, here gives a resume of some of his observations. He presents interesting information regarding termites themselves and comments upon various methods of protecting against termite inroads.**

A WOODEN pole used for telephone, telegraph, electric light or power service is merely an uprooted dead tree with roots and bark removed. Hence it is subject to attack by wood-boring insects and decay or rot just as is a dead tree. Poles in general formerly were not treated with chemical wood preservatives, as now is almost universally necessary for proper protection from wood-boring insects and wood-destroying decay. The termite or white ant is one of the most destructive types of insects which damage and destroy poles.

Termites or "white ants" are not true ants although they are superficially ant-like and live in large colonies made up of different forms or castes, and are social insects. In these nests or colonies both wingless and winged mature individuals are produced. The brownish or blackish, elongated, slender, ant-like, sexed adults, Fig. 1 (1) with long white wings, unlike the other forms have functional eyes and are able to endure full sunlight. These migratory males and females appear normally only once a year, during a short period either in the spring or fall, when there is a colonizing migration to begin new colonies.

The grayish-white, soft-bodied, wingless "workers," Fig. 1 (2), in reality are the destructive form. These workers make the excavations and enlarge and extend the colony as this becomes necessary. They live underground, shun the light and therefore are rarely seen. Among the non-subterranean termites there are no workers, the duties being taken over by the immature nymphs or young. The soft-bodied, wingless "soldiers," Fig. 1 (3), which have elongated narrow heads armed with long, slender, saber-shaped jaws, and the workers are the most numerous forms permanently present in a colony. Other forms in the colony are the reproductive individuals. In some colonies these reproducers consist of a single pair, the normal king

and queen, Fig. 1 (4), while in other colonies many nymph-like types, Fig. 1 (5), may be present. These reproductive forms never reach the size attained by those of certain species of termites in the tropics, and never lose the power of movement.

There are two types of termites in California, the smaller subterranean and larger non-subterranean type. The former type always attacks poles and other timber from the ground through which these termites burrow and with which they must maintain contact in order to obtain the moisture so necessary to their life. Their chief injury to poles usually is near the ground line, the point of greatest structural weakness in the pole. Damage to poles by these subterranean termites may, however, extend high up in the pole and the wood be completely honeycombed up to considerable heights, Fig. 2 (4). The burrows usually are longitudinal and follow the grain of the wood. Often decay or rot is associated with their damage and the pole is seriously structurally weakened.

Earth-like shelter tubes sometimes are built on poles, especially along, in and over seasoning checks. By means of these little tunnels the termites are able to penetrate poles improperly treated with chemical wood preservatives, Fig. 2 (7).

The larger non-subterranean type of termite never burrows in the ground, does not need much moisture for life, and attacks wood directly. It flies to the wood and bores in. Poles usually are attacked well above the ground line or point of greatest weakness and are damaged in the middle and top, Fig. 3. Crossarms and insulator pins, Fig. 2 (5 and 6) also are damaged by this "dry wood" termite. This termite can live in wood containing less than the 10 per cent of the moisture normal to air-dried wood and, unlike the subterranean termite, is not closely associated with decay. A method of detecting their presence in the wood of poles is the small, oval, impressed pellets of excreted wood which fall from the poles and which can be seen in piles at the base or along the sides, Fig. 2 (1).

Sometimes the galleries of these two types of termites meet near the base of the pole. Unlike the workings of the subterranean termites, the chambers of the non-subterranean termites may cut across the grain of the wood, Fig. 2 (3 and 8).

Subterranean termites are damaging poles in all sections of California, but similar serious injury by the non-subterranean termites apparently occurs only in the southern portions of the state, not far north of Monterey on the coast. The San Joaquin Valley to date has experienced no injury from non-subterranean termites. Hence, while of great importance due to their habits which enable them to damage poles which have only the butts or bases impregnated with chemical preservatives, their limited distribution renders them less dangerous. Also, while non-subterranean termites seriously damage poles, often from top to near the bottom, their injuries are to those portions of poles where great structural strength is not so important. Injury to that area of the pole just above and below the ground line by sub-

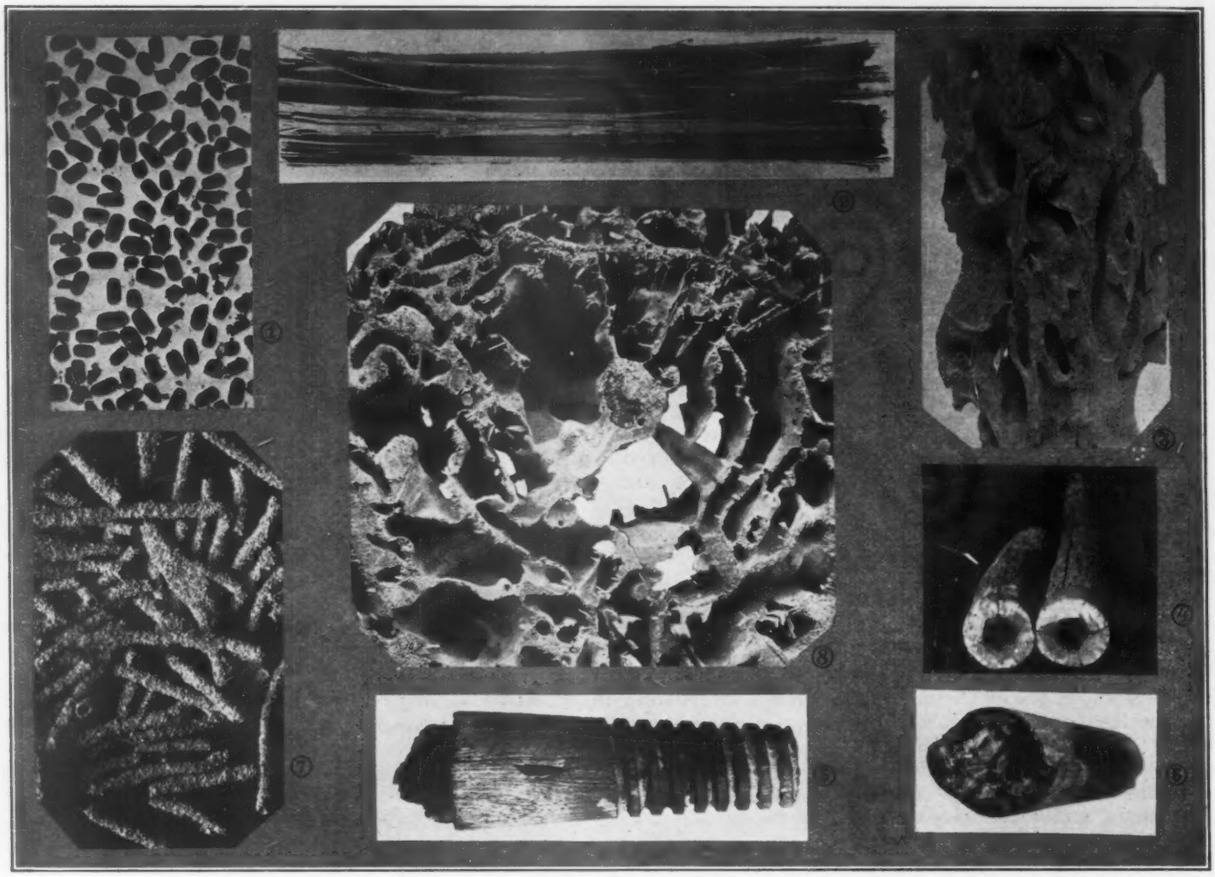


Fig. 2. (1) Tiny pellets of excrement of non-subterranean termite which may be found in, on, or around infested wood. (2) Timber completely honeycombed by subterranean termites, the softer wood gone, leaving only parts of the harder layers. (3) Arizona cottonwood timber ruined by subterranean termites. (4) Section through pole showing subterranean termite penetration up through heart-wood and showing bad season checks. (5 and 6) Damage to untreated black locust insulator pin by non-subterranean termites. (7) Earth-like shelter tubes built by subterranean termites along impenetrable materials to provide a protecting passage for the soft-bodied blind termites wherein they may travel from the ground up over an obstruction such as a butt-treated pole section and enter unprotected wood above. Tubes as shown are practically life-size. (8) A pole section ruined by non-subterranean termites; careful scrutiny will show the tiny pellets of excreted material in some of the pockets.

terranean termites structurally weakens poles and they "go down" or fall over, usually during the stress of a storm. Although poles may be heavily infested with non-subterranean termites they usually continue to stand in the line.

However, the infestation by non-subterranean termites of outer layers of the middle and upper portions of poles often so weakens and softens the wood that the spurs of the linemen cannot grip into the wood, thus making such poles dangerous to climb.

Since both the subterranean and non-subterranean termites are native there is no reason to believe that

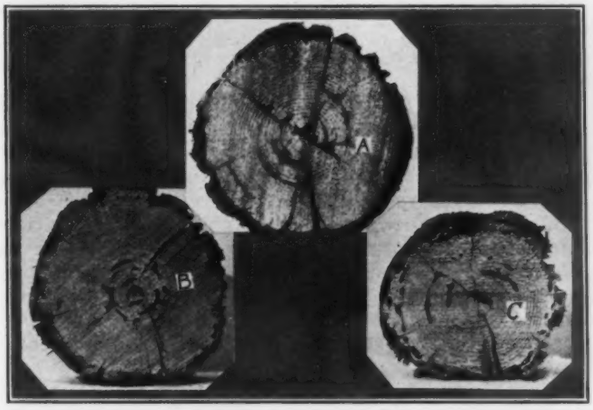



Fig. 3. Sections through a pole set at Santa Monica, Calif., showing serious damage from non-subterranean termites. For experimental purposes a part of this pole was treated in 1921, subsequent to initial termite damage, and replaced in service to remain there until a few months ago. Section "A" shows the penetration of treating fluid that apparently arrested termite attack. Section "B" shows less penetration and greater damage at another point. Section "C" shows serious damage near top of pole. Note that the non-subterranean termites penetrate through to the heart-wood.

they will spread outside of their natural range or habitat, but, due to man's destruction of their natural breeding places in the forests (with the destruction of forests, clearing of land and advancing civilization and cultivation) they probably will become increasingly destructive to poles and other works of man.

No general recommendations for the preservative treatment of poles can be made for the entire state of California. Indeed it is largely a matter for each individual company utilizing poles to determine the methods most suitable for preserving its poles based upon possible investment, length of service required and the amount of damage experienced by one or both of these types of termites, as well as by actual decay. The entomologist can advise as to the type of termite doing the damage and give advice as to the possibility of injury by other types, but he cannot and should not be expected to give general advice. Statements can be made, however, as to amount of protection and length of service to be expected from different types of preservative treatments. Also advice can be given as to how to prolong the life of termite-infested poles already in service.

*Superficial Preservative Treatments*—Impregnation with standard grades of coal-tar creosote is the most effective and practicable method of wood preservation for poles where long service is to be required. Such treatment is costly, but thoroughly protects poles from attacks from wood-boring insects and wood-destroying decay.

Such superficial methods of application as brushing with or dipping poles in coal-tar creosote are effective only temporarily, but will add length of service to poles. In commercial enterprises the type of treatment must necessarily be determined by cost and length of service to be expected.

When brush treatments are used only high-grade antiseptic preservatives such as standard grades of coal-tar creosote oils or carbolineums should be employed since the cost of application of brush treatment often is high. The cost of any treatment necessarily should be more than offset by the longer service assured by the application. The several methods of application or impregnation of the preservative should be determined by the length of service required and the consequent expenditure warranted. Brushing several coats of coal-tar creosote on timber may add from 2 to 5 years to its life. Red and green pigments may be added to the oil to give the wood a painted appearance.

Both brushing and dipping applications of coal-tar creosote penetrate the wood only slightly and permanent protection is not to be expected. After such treatments the poles often "season-check" and such crevices afford entrance to both insects and decay.

*Impregnation by Open-Tank Process*—Impregnation of the butts of poles with coal-tar creosote by the open-tank method will protect poles effectively from attack by the subterranean types of termites and from decay near the ground line, where the greatest structural strength is required in poles. Impregnation by this method with coal-tar creosote renders wood resistant to attack by these termites for at least 15 years. The method can be utilized in treating poles with makeshift or homemade equipment and unskilled labor can be employed. In the case of improperly seasoned poles or in certain climates the wood might open up with season checks which extend deeply into the pole beyond or through the outer treated area. Penetration attained by this impregnation process is not always great and cannot compare with that obtained by using a pressure process.

*Impregnation by Pressure Process*—Impregnation of the pole for its entire length with coal-tar creosote of a standard grade by the "full cell" pressure process

Fig. 4. A portion of the test ground "grave yard" on Barro Colorado Island, Canal Zone, Panama. The pieces of test wood are impregnated in various manners and with various preservatives in order to obtain definite and comparable data. Thirty species of wood-destroying termites are native to this island which with its dense tropical growth makes an ideal test site. While a large number of preservatives have been tested in this plot and in similar test plots in the United States, no chemical superior to coal-tar creosote has been discovered for timber to be used in contact with the ground.

renders the wood resistant to termite attack for at least 30 years. If, as in cities, there is danger of the creosote "bleeding," "sweating" or oozing out in hot weather, the "empty cell" method can be used for poles. With this variation of the pressure method part of the creosote oil is withdrawn and there is no danger of persons soiling their clothing by contact with such creosoted poles. Furthermore, they are less difficult and disagreeable to handle and the setting crews do not object to working with them. The use of heavy gloves and a little care

should overcome all difficulties of workmen in handling creosoted poles.

The use of a pressure process requires special expensive equipment and skilled labor. Most companies utilizing such impregnated poles purchase them already treated. By the use of increment borers the average penetration of the creosote can be determined. In the case of southern yellow pine with much sapwood a uniform penetration of three inches can be attained. While Douglas fir has been more difficult to impregnate a satisfactory penetration to the extent of the sapwood can be attained. In areas where they are seriously damaged by non-subterranean termites, pine or Douglas fir crossarms and insulator pins also can be impregnated with coal-tar creosote.

*Creosoted Poles Can Be Painted*—If it is desired, as in cities, to paint poles after impregnation they can be painted over the creosote with an aluminum paint and the creosote will not show through. After this first coat of aluminum paint the pole can be repainted if other colors are desired.

*Combination Impregnation and Superficial Treatments*—After the butts of poles have received an open-tank impregnation treatment, they may be dipped for their entire length in an elongated vat filled with hot coal-tar creosote. Such additional treatment will afford some protection to the upper portion of the pole from attack by non-subterranean termites and decay. This vat should be wide enough and deep enough to hold at least 3 or 4 poles at once and the poles should be turned or creosote poured over them with a scoop.

In no sense is this to be classified as an open-tank treatment, but offers some protection to the pole because the creosote penetrates season checks and other holes. It is not an expensive treatment compared to full-length impregnation of poles and homemade equipment and unskilled labor can be used. While still in the experimental stage the combination process appears promising. Old poles which have been infested by non-subterranean termites also can be treated thus after they have been removed and their possible additional length of service increased.

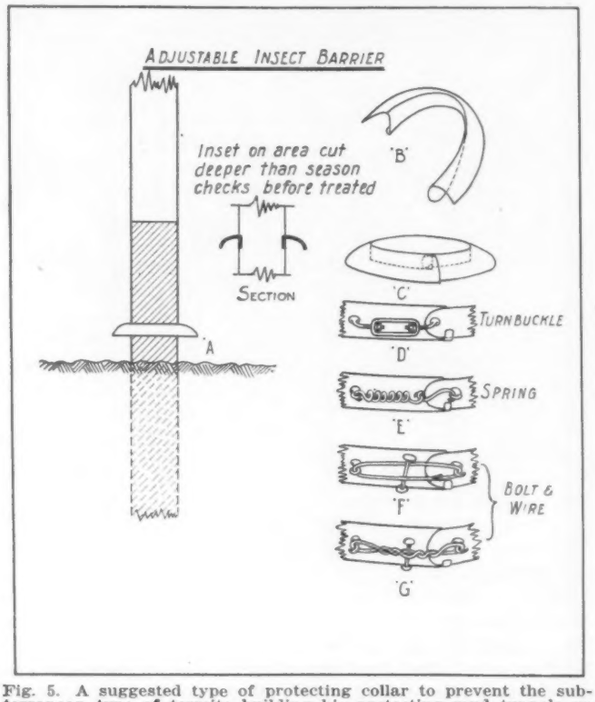



Fig. 5. A suggested type of protecting collar to prevent the subterranean type of termite building his protecting mud tunnels up over the creosoted section and thus to the unprotected wood.

### Treatments for Poles Already in Place

Due to the large amount of money invested in standing poles, experiments have been conducted for some time with the view of prolonging their life. Among the various methods of obtaining maximum service from a standing pole, the following are worthy of mention:

*Stumping*—Poles damaged at the base sometimes are braced by fastening to them an auxiliary stub or stump impregnated with coal-tar creosote.

*Resetting*—Butts of damaged poles are cut off and the portion of the pole to go in the ground is brushed with coal-tar creosote. This of course lowers the height of the wires.

*Charring and Spraying*—Butts of poles are charred with a blow torch and then sprayed with coal-tar creosote or kerosene oil, thus insuring greater penetration of these oils.

*Cold Treater Dust*—Cold treater dust, an arsenical residue or smelter waste, is placed about the base of the pole to some depth below ground. This treatment may protect the pole from subterranean termites and decay. Experiments as yet are not conclusive.

*Spraying or Fumigation*—So far as records are available such treatments give no permanent protection to poles from termite attack. No penetration into the wood is secured with the poisonous chemicals and the gases have no permanent results in sterilizing either the wood or the soil. These statements apply only to continental United States.

*Heat Sterilization*—Where it is desired to stop the working of non-subterranean termites in standing poles which have been removed, or in untreated poles infested before placed in service, poles can be subjected to a temperature of from 135 deg. F. to 150 deg. F. with a saturated atmosphere of 100 per cent humidity in a tight chamber such as a kiln. This temperature maintained for 1½ hours will kill the termites. Such a treatment is not necessary in the case of the subterranean termites which will dry up and die soon after the pole is removed from the moist soil, as they must maintain contact with the earth in order to obtain the moisture so necessary to their life.

### Miscellany and Conclusions

Subterranean termites will not attack poles set in a constantly water-saturated soil or in soils saturated with salts, alkaline.

In the case of pole yards where old poles infested with non-subterranean termites are stored in order to be salvaged, *no untreated new poles should be stored.* These termites will live more or less indefinitely in the old poles and, when they fly or swarm once each year, in late summer or early fall in California, they will attack the new poles. These poles then will be infested before giving any service in the line.

Termite damage to poles in California is serious; that by subterranean termites is fairly widespread and most serious. This injury can be prevented by treating the butts of the poles with coal-tar creosote. Damage by non-subterranean termites is serious, but less widespread. Impregnation of the entire pole with coal-tar creosote by a pressure process will prevent such damage, but is more costly. A combination of butt treating poles and then dipping the entire pole in coal-tar creosote may prove to be a less expensive compromise. Certain measures can be taken to prolong the life of poles already in the line as a form of insurance of capital invested. Poles infested with non-subterranean termites should not be stored in yards where new untreated poles are in storage.

The treatment to be given poles must be decided by the user, basing conclusions upon amount of loss, length of service to be expected and capital available.

# Telling the Story of Electric Service to Women by Women

By Ruth E. Creveling

San Diego Consolidated Gas & Electric Company; chairman, Women's Committee, Pacific Coast Electrical Association.

AN ECCENTRIC man of my acquaintance pays his barber $1.50 for a haircut. That sounds pretty steep, even at the present tariff scale of the average tonsorial engineer, but here's how! Every other Tuesday my friend slips into the shearing emporium just at closing time. After the establishment is shut up and the doors locked, he removes his collar and tie, climbs aboard the pedestal, allows the polka-dotted hair receiver to be adjusted to his ample neck, then leans back and sighs in seraphic content—now he can get a hair cut in peace! Why? Why, because there is now no danger of, from or by women. And I have a hunch that my friend has no monopoly on this particular eccentricity. Some men who wouldn't mind the least bit running against women candidates for the senatorial or gubernatorial chair, are furious to the point of apoplexy when they enter a barber shop and find a line-up of feminine candidates for the tonsorial chair ahead of them.

**ONE OF the most important steps in improved public relations has been the group organization of the women of the industry. Through Women's Committees the story of the industry is being spread intelligently in a fashion undreamed of a few years ago. In this article the author describes the functions and functioning of the Women's Committee.**

Who can blame them? Women obtained a foothold on phase after phase of the mannish realm during the war. No one minded then, not even the men themselves. Were we not admonished to buy Liberty Bonds until it hurt, roll bandages until it hurt, knit socks until they hurt (I know those I knit must have!), and such? True the ladies were not given *carte blanche* to retain and entrench their position in modern industry "until it hurt" the self-assurance of the hitherto undisputed lords of creation in general and of industry in particular. Women have vied with their brothers in every occupation from plastering to bridge building and from welding to flagpole sitting. But the woman-in-industry bogey has gradually lost its elements of novelty and sensationalism and has resolved into such an everyday part of our lives that it has ceased even to be a fruitful topic for debate.

In some niches of the workaday world women have been found, and indeed found themselves, to be misfits. On the other hand in many branches of business they have proved themselves to be somewhat in the nature of an answer to the industry's prayer.

For instance in the electrical field—the Women's Committee. Not only the Women's Committee idea and the Women's Committee personnel, but far more important than either of these, the Women's Committee accomplishments. The idea had its inception some six years ago, or more correctly it began to come to fruition six years ago, for the idea itself is such an obvious one that it must surely have been held by some at a much earlier date than 1921. At any rate in that year the National Electric Light Association established within its Public Relations Section a Women's Committee "on Public Utility Information" as it was at first called.

And the idea? Just this. From the very first introduction of crude electrical illumination and electrical appliances into the domestic sphere, woman has been the chief beneficiary. She it is who has been freed from the squirrel-cage routine of daily household duties which, once upon a time, must needs be accomplished by hand power, or "elbow grease" as our grandmothers used to call it. Enlisted in her corps of dependable and efficient servants have come successively the electric iron, the electric washing machine, the vacuum cleaner, electric sewing machine, toaster, percolator, grill, range, water heater, and—of growing prominence—the electric refrigerator. At this point let us not forget to list among the primary boons to woman that humble but all-important metal contraption upon which so many of us depend for the transformation of our stringlets into ringlets—the electric curling iron. Before I knew or cared anything about an electric utility company, my everready electric curling iron was the best little public relationist that ever entered my home.

Is it the industrial load that causes the central station palpitation of the turbine? Is it the street lighting load or the electric railway load that forms the theme of electrical conventions? Perhaps, but not at the conventions of the past three years, where the keynote has been domestic load, *domestic load,* DOMESTIC LOAD, until one began to think that if it is such a potential gold mine they might as well refer to it as the "Domestic Lode." Not a bad idea, come to ponder on it. "Lode" is something extremely valuable to dig up and put into circulation. Who can open up and help develop this billion dollar vein of pay dirt better than the women, the homemakers of the nation?

### A Boon to Housewives

Electricity has already transformed "housekeeping" into "home-making"; this for the reason that a woman who has been released from hours of manual labor through the use of mechanical servants has just that much added length of time and strength of body to devote to more constructive home-making. It is to be regretted that electricity has not taken this role of welcome emancipator in a universal way. There yet remain more than two million unwired homes in the United States. Even in the nearly sixteen million wired homes where the good genie, Electricity, stands ready to free housewives from the largest part of their manual labor, but a relatively small number are equipped with more than one or two electrical appliances. Thousands of others use the service for purposes of lighting only.

Why is there not a more general use of electrical appliances, especially those covering the cooking, heating and refrigeration fields? Seemingly it is because the housewives are still in woeful ignorance of the labor-saving and economy involved. Then too, more of them than we realize yet have that lurking suspicion of doubt about the uprightness of the electric utility company. As one old lady said to me not long ago: "Oh, yes, of *course* the electric company wants me to use a lot of contraptions so I'll have a high electric bill. Me buy a vacuum cleaner? I should say not! I'll be hanged if I wouldn't rather keep on using my broom than pay more money into that old corporation!"

### Why the Women's Committee?

The Women's Committee started on these simple premises:

No one understands the needs, the psychology or the problems of woman except woman. No class of women in the world is in such a favorable position to comprehend the service rendered by the electric utilities as are the women employees of those same electric utilities. Therefore, what more ideal group for making favorable contact and developing friendly and cordial understanding between the homemakers and the electric service company than this big army of women who are entirely sympathetic with both the utility companies and with the women consumers?

There are nearly fifty thousand women employed in the offices of electric light and power companies in the United States; some companies have but five or six, others a thousand or more. A large percentage of this number is now organized into Women's Committees.

Let us, for example, briefly follow a few months' work of the Women's Committee in the Smithville Electric Light & Power Company. Their committee consists, as it does in all other companies, of every woman employee; one of their number is chairman. Each month they hold a meeting, preparation for which has started two or three weeks prior to the meeting date.

The first thing they studied was the aim and purpose of public relations work in general and of the Women's Committee share in particular. From this they proceeded to the study of their own company, the Smithville Electric Light & Power Company. They heard from their manager the interesting story of how the company was organized, its rate of growth during the past ten years, how it obtained its franchise, how it is financed, and many other facts that made them see Smithville and Smithville's power company in a new and different light. Later on they had a meeting on rates, at which time five different young ladies who had spent many hours preparing their brief talks, discussed the company's prevailing rates and its methods of rate-making, also the supervision exercised over the company by the state regulatory commission. At the end of this meeting they held a written examination and the girl who made the most nearly correct summary of the subject was given an electric toaster, donated of course by the Smithville Electric Light & Power Company.

The next month they were the guests of the superintendent of Smithville's largest generating station and they learned more in this visual manner and from the superintendent's simple explanation, than they could have learned by themselves from a whole library of electrical books. They next progressed to the study of distribution, and many of them learned for the first time the extent of territory served by the company in and around Smithville. Nor, until this meeting, had it ever occurred to the sweet things that it costs dozens of thousands of dollars a year to maintain lines and services once they are installed.

Later they spent a profitable hour and a half learning how to read meters and how bills are figured, how high bill complaints are handled, which are the most frequent complaints, and how all the girls of the Smithville power company could be prepared to answer them. Two or three meetings were devoted to the study of electrical appliances, and the girls were given demonstrations of the electric range, cooker, washing machine, ironer, waffle iron, and refrigerator. Demonstrators were either from the home service department or from manufacturers' representatives. They also took up a thorough step-by-step study of the Red Seal Plan, correct wiring of the home, and the importance and simplicity of proper home lighting. When they went into the study of first aid as practiced by the Smithville power company, they did so with the keenest interest and enthusiasm. Every member of the Women's Committee became proficient in the prone pressure method of resuscitation and thereafter was called on several times a year to give demonstrations before Scout or school groups.

Interspersed with the above studies and pursuits, the committee found time to produce a playlet or two on a public relations or electricity-in-the-home theme. These playlets were given at the Smithville Electric Club, before the power company's employee association, before the Smithville Rotarians, the Smithville Lions, the Smithville Ladies' Aid Society, and the Smithville Junior High School. The Women's Committee became well known to the housewives and women's clubs in Smithville. Occasionally when they wanted a unique program, or a talk on better home-making, they called on the Women's Committee, which never failed them.

### A National Movement

What is happening in Smithville is happening all over the United States and—as the Floridian would put it—*even in California.* In many of the major electric utilities there is an efficient and busily functioning Women's Committee. Some which have organized only within the past six months are showing most remarkable progress. In one of the smaller companies the district offices are scattered and it is necessary to hold the meetings at night. Some of the girls have to drive eighteen and twenty miles to come to the meeting place, and please believe me when I tell you that they average from 80 to 95 per cent perfect attendance. Doesn't this show that the committee means something besides grim duty to these young women who have worked hard all day? And is it difficult to imagine what the committe means to that company?

National women's magazines, among them the *Woman's Home Companion,* are beginning to tell the housewives of the nation about the work of the Women's Committee of the National Electric Light Association. Inquiries are being made frequently as to the scope of their activities and studies. Answers to such inquiries today would be but partially adequate next year for the scope of the Women's Committee progress is widening all the time.

Thanks to the splendid support and encouragement which has been given its Women's Committee program by the industry the work has made rapid strides. And —what is most gratifying to those who appreciate its possibilities, is the fact that it is daily becoming more valuable to the electrical industry and that, at its present rate of progress, the Women's Committee cannot fail to develop into the most important of all units for the intelligent distribution of the story of electric service—to women, by women.

# Distribution of Electrical and Radio Equipment

FIGURES concerning population which now are supplied by the Census Bureau are an indispensable factual basis for reasoning about people. All market study starts with these figures as a foundation. Similarly the census figures about production—manufacturing, agriculture, mining—make available basic information about the creation of goods for the consumption of these people. But, hitherto, the important mechanism by which goods as produced are brought to people who are to consume them has had no place in official figures. During the year just closed the government has taken the first step toward filling this gap in official figures. There has been instituted a census of distribution in which studies have been made in a number of representative communities. Included in this census of distribution are figures for the San Francisco Bay region, including the cities of San Francisco, Oakland, Alameda and Berkeley, for Seattle and for Denver. Merchants, economists, manufacturers, advertising men, in fact, all who are interested in commercial or industrial growth will welcome these studies of the distributing equipment in some of the representative cities of the country.

**FOR the first time in the history of industry accurate and official figures have been collected on the distribution of commodities in various sections of the country. Data on wholesale and retail electrical and radio distribution in several representative cities surveyed by the Census Bureau are presented in this article. The results of the surveys should be of considerable interest and assistance to all who are interested in commercial and industrial development.**

In the accompaning tables there are presented data covering the distribution of electrical appliances and supplies and radio sets and equipment for the cities in the Western states that were selected by the Census Bureau for study. The studies included all business establishments other than those embraced in the Census of Manufactures and were divided into two classes: first, those engaged primarily in the distribution of commodities; and second, those whose income is derived principally from the performance of a personal service. Because of the difficulty in locating persons of the second class and on account of the incompleteness of the data, all figures relating to other than strictly merchandise outlets have been excluded from the surveys. Concerns engaged in manufacturing and whose operations included a large distribution element were included. Electrical appliances sold by public utilities were included and the merchandising departments of such establishments were listed among the selling organizations. Separate classifications were included for retail and wholesale outlets and where an establishment engaged in both types of business it was listed under the classification in which the greater proportion of business fell. Manufacturers' agents and manufacturers' district sales offices are included in the wholesale listing.

## Retail Distribution—San Francisco

Of the 8,624 retail establishments in San Francisco doing a total gross business in 1926 of $442,173,600, only 103 stores could be classed as strictly electrical. The gross volume of these 103 stores was $4,872,400. There were 428 employees or an average of slightly

TABLE I—RETAIL DISTRIBUTION OF ELECTRICAL APPLIANCES AND SUPPLIES AND RADIO

| | Number of Establishments | Persons Engaged: Employees | Persons Engaged: Firm Members and Proprietors | Persons Engaged: Total | Salaries and Wages* | Merchandise Inventory Dec. 31, 1926 | Total Sales |
|---|---|---|---|---|---|---|---|
| **San Francisco—** | | | | | | | |
| Electrical Appliances and Supplies | 103 | 428 | 102 | 530 | 921,000 | 1,032,400 | 4,872,400 |
| Radio | 43 | 106 | 46 | 152 | 149,600 | 270,800 | 1,737,300 |
| **Oakland—** | | | | | | | |
| Electrical Appliances and Supplies | 36 | 121 | 49 | 170 | 211,900 | 250,400 | 1,590,100 |
| Radio | 25 | 31 | 27 | 58 | 38,200 | 57,500 | 426,000 |
| **Berkeley—** | | | | | | | |
| Electrical Appliances and Supplies | 17 | 21 | 23 | 44 | 47,800 | 55,800 | 407,700 |
| Radio | 7 | 5 | 8 | 13 | 9,300 | 17,700 | 85,800 |
| **Alameda—** | | | | | | | |
| Electrical Appliances and Supplies | 5 | 8 | 5 | 13 | 11,800 | 27,700 | 142,300 |
| **Seattle—** | | | | | | | |
| Electrical Appliances and Supplies | 66 | 337 | 53 | 390 | 472,100 | 589,700 | 2,642,800 |
| Radio | 27 | 70 | 29 | 99 | 88,700 | 148,600 | 703,500 |
| **Denver—** | | | | | | | |
| Electrical Appliances and Supplies | 39 | 316 | 37 | 353 | 628,800 | 445,900 | 2,383,300 |
| Radio | 10 | 23 | 10 | 33 | 17,200 | 45,500 | 150,400 |

* Does not include any form of remuneration to proprietors and firm members.

more than four per store. Of these 428 employees 182 were classed as selling and 246 as non-selling. The average wage or salary per employee was $2,152. The total merchandise inventory on Dec. 31, 1926 computed on a cost basis was $1,032,400.

Electrical appliances and supplies were retailed by 242 merchandise outlets in San Francisco which did a total volume of $5,311,200. Thus the 139 outlets falling outside the strictly electrical classification only did a volume of $438,800 or an average per outlet of $3,150 as against an average of $47,350 for the strictly electrical group.

Of the 103 electrical outlets 29 did an annual gross volume of less than $5,000 per year; eight fell in the $5,000-$10,000 class; 19 in the $10,000-$50,000 class; 17 in the $50,000-$100,000 class; six in the $100,000-$250,000 group and 14 sold more than $250,000 per year.

There were in San Francisco at the time the survey was conducted 21 outlets engaged strictly in the sale of radio sets and equipment. These stores had 106 employees of which 61 could be classed as selling; had a merchandise inventory of $270,800 and did a gross volume of business of $1,737,300. There were 69 other outlets for radio sets and equipment, including department stores, music stores, electrical stores and others. The gross volume of the entire group of 90 outlets was $2,992,600. Thus the 21 strictly radio outlets did approximately 57 per cent of the business.

**TABLE II—DATA ON EMPLOYEES**

| | Total | Selling | Non-Selling | Av. Wages and Salaries |
|---|---|---|---|---|
| **San Francisco—** | | | | |
| Electrical Appliances and Supplies | 428 | 182 | 246 | $2,152 |
| Radio | 106 | 61 | 45 | 1,411 |
| **Oakland—** | | | | |
| Electrical Appliances and Supplies | 121 | 68 | 53 | 1,751 |
| Radio | 31 | 25 | 6 | 1,232 |
| **Berkeley—** | | | | |
| Electrical Appliances and Supplies | 21 | 15 | 6 | 2,276 |
| Radio | 5 | 5 | .... | 1,860 |
| **Seattle—** | | | | |
| Electrical Appliances and Supplies | 337 | 137 | 200 | 1,401 |
| Radio | 70 | 54 | 16 | 1,267 |
| **Denver—** | | | | |
| Electrical Appliances and Supplies | 316 | 201 | 115 | 1,990 |
| Radio | 23 | 15 | 8 | 748 |

**TABLE III—CLASSIFICATION OF RETAIL ELECTRICAL ESTABLISHMENTS BY VOLUME OF SALES**

| | Less than $5,000 | $5,000 to $9,999 | $10,000 to $49,999 | $50,000 to $99,999 | $100,000 to $249,999 | $250,000 and Over |
|---|---|---|---|---|---|---|
| San Francisco | 29 | 8 | 19 | 17 | 6 | 14 |
| Oakland | 4 | 66 | 18 | 5 | [illegible] | [illegible] |
| Seattle | 21 | 6 | 18 | 11 | [illegible] | [illegible] |
| Denver | 10 | 9 | 14 | 6 | — | — |

**TABLE IV—VOLUME OF SALES—ELECTRICAL APPLIANCES AND SUPPLIES**

| | No. of Outlets | Sales |
|---|---|---|
| San Francisco | 242 | $5,311,200 |
| Oakland | 80 | 2,099,100 |
| Seattle | 174 | 3,029,500 |
| Denver | 67 | 2,423,400 |

**TABLE V—VOLUME OF SALES—RADIO**

| | No. of Outlets | Sales |
|---|---|---|
| San Francisco | 90 | $2,992,600 |
| Oakland | 45 | 1,268,500 |
| Seattle | 76 | 1,119,700 |
| Denver | 39 | 579,100 |

### Wholesale Distribution—San Francisco

San Francisco had 2,798 wholesale establishments employing 36,220 persons at the time of the survey. The gross volume of business in 1926 of $1,430,882,600 indicates the importance of this city as a distribution center. There were in the city 92 electrical wholesale outlets, having on Dec. 31, 1926, an inventory of $4,711,600, and doing a gross volume of business during that year of $38,221,400. These establishments maintained 1,544 employees and paid out in salaries and wages in 1926 $2,911,800.

There are 21 wholesale radio distributors doing an annual gross business of $4,888,900. They employ 233 persons and pay $380,100 in salaries and wages. The merchandise inventory Dec. 31, 1926, was $871,800.

### Other Western Cities

Data on Oakland, Berkeley, Alameda and Seattle, similar to that presented for San Francisco, is given in the accompanying tables. Table I gives information on retail distribution for both electrical appliances and supplies and radio sets and equipment for the various cities studied. Table II presents data on employees of the retail establishments with a segregation between selling and non-selling and the average salary or wage.

A classification of retail electrical establishments according to the annual volume of sales for the various cities surveyed is given in Table III. The total volume of retail electrical sales together with the number of outlets, both electrical and non-electrical, is given in Table IV. The same information for radio sales is presented in Table V. Table VI offers information on the wholesale distribution of electrical appliances and supplies and radio sets and equipment. The importance of San Francisco, Seattle and Denver as distribution centers for large tributary areas is indicated by a comparison of the retail sales for these cities with the gross volume of wholesale business.

The information presented in this article is but a part of the data contained in the surveys. Every class of trade is represented in as complete detail as is here offered for the electrical and radio trades.

**TABLE VI—WHOLESALE DISTRIBUTION OF ELECTRICAL APPLIANCES AND SUPPLIES AND RADIO**

| | Number of Establishments | Persons Engaged | | | Total Salaries and Wages* | Merchandise Inventory Dec. 31, 2926 | Total Sales |
|---|---|---|---|---|---|---|---|
| | | Employees | Firm Members and Proprietors | Total | | | |
| **San Francisco—** | | | | | | | |
| Electrical Appliances and Supplies | 92 | 1,544 | 54 | 1,598 | 2,911,800 | 4,711,600 | 38,221,400 |
| Radio | 21 | 233 | 12 | 245 | 380,100 | 871,800 | 4,888,900 |
| **Oakland—** | | | | | | | |
| Electrical Appliances and Supplies | 16 | 137 | 3 | 140 | 238,300 | 2,018,600 | 2,815,200 |
| Radio | 9 | 128 | 5 | 133 | 287,400 | 915,500 | 2,927,200 |
| **Seattle—** | | | | | | | |
| Electrical Appliances and Supplies | 68 | 532 | 36 | 568 | 1,018,000 | 1,907,200 | 23,235,800 |
| Radio | 8 | 55 | 2 | 57 | 60,700 | 218,200 | 1,371,900 |
| **Denver—** | | | | | | | |
| Electrical Appliances and Supplies | 27 | 335 | 13 | 348 | 608,800 | 866,400 | * 11,696,600 |
| Radio | 7 | 53 | 2 | 55 | 100,900 | 136,900 | 985,700 |

* Does not include any form of remuneration to proprietors and firm members.

# Recent Industrial Heating Installations in San Francisco Bay Region

WHILE the possible fields for the successful application of electric heat to the needs of industry are almost without limit less than 3 per cent of the available industrial heating load has been developed. Few loads offer greater possibilities and few have received less attention from the central stations, particularly in the Western states. Yet during the past few years there have been perfected a number of standard types of dependable and efficient electrical equipment that can be used in a variety of present-day industrial heating operations. This constant improvement in electric heating equipment, coupled with the growing knowledge regarding its use and the attractive nature of the load, has served to focus the attention of central stations on this field with the result that considerable progress in the development of this load may be expected in the next few years.

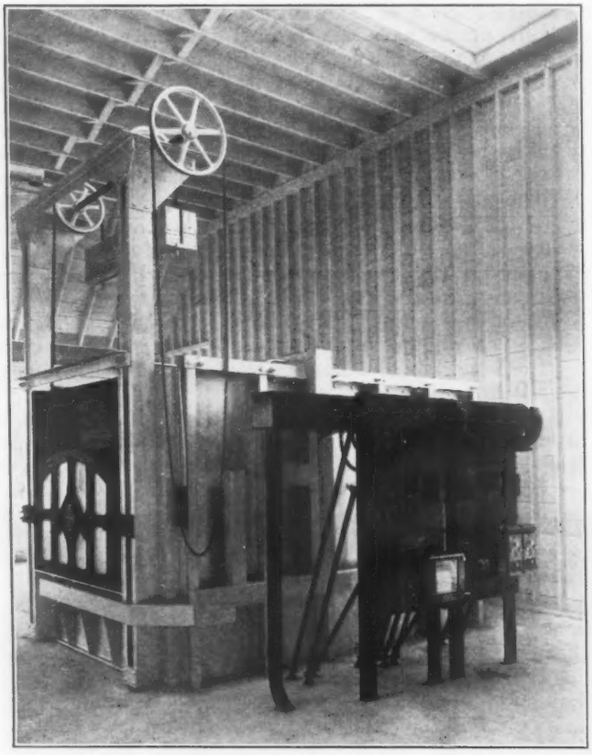
Moreover this same improvement in heating equipment with the resultant manifold advantages, combined with the steadily decreasing cost of electric power has aroused the interest of industry itself. As a consequence industrial plants are turning to electricity for the performance of many of the complex heating tasks that heretofore have been accomplished with solid, liquid or gaseous fuels. The increasing trend in the application of electric heat to industry as well as the growing interest of industry itself is shown by a survey of some of the important heating loads added to the lines of the power companies serving the San Francisco Bay region.

Foremost among the installations is the 225-kw. Hagan enameling furnace at the plant of the Porcelain Enameled Products Company of San Francisco. The furnace is used for the enameling of signs, stove parts, refrigerator linings, restaurant fixtures, hardware, and bathroom fixtures. In addition the company recently has perfected a line of decorated enameled ware. The furnace is equipped with automatic temperature control for both the top and bottom elements as well as with temperature recording instruments.

Among the advantages of the electric furnace cited by the company is an increased production of 50 per cent per unit of floor space. In addition there have

Interior of the plant of the Porcelain Enameled Products Company showing the 225-kw. Hagan enameling furnace.

been no shutdowns for relining or repairs. Using oil as a fuel, it would be necessary for the plant to have two furnaces to prevent shutdowns for relining. The electric furnace has practically eliminated rejects or seconds caused by faulty burning. The even distribution of temperature has enabled the operator to load the furnace up to 100 per cent of its hearth area. Moreover electricity has eliminated the expense for firing, handling and storing fuel. There is a marked improvement in the quality and color of the finished



Enameling furnace and control board at plant of Porcelain Enameled Products Company.

product directly traceable to the clean, dust-proof burning chamber resulting from the application of electric heat. In addition maintenance costs have been almost negligible and the productive ability of the labor employed has been increased materially.

Additional heating equipment at this plant includes a 22-kw. Young Bros. tunnel-type truck oven. This oven is used for drying the successive coats of enamel between spraying operations prior to the time the pieces are placed in the furnace.

### Heat-Treating Installation

Another noteworthy installation is the 66-kw. Hagan heat-treating furnace at the plant of the Pacific Gear & Tool Works, San Francisco. This furnace is used for carburizing, hardening, tempering and annealing. The one electric furnace with a hearth area of slightly more than 16 sq.ft. does more work than four oil-fired furnaces having a hearth area of 20 sq.ft. Pinions, shafts, threading dies and gears weighing up to 800 lb. are heat treated in the furnace.

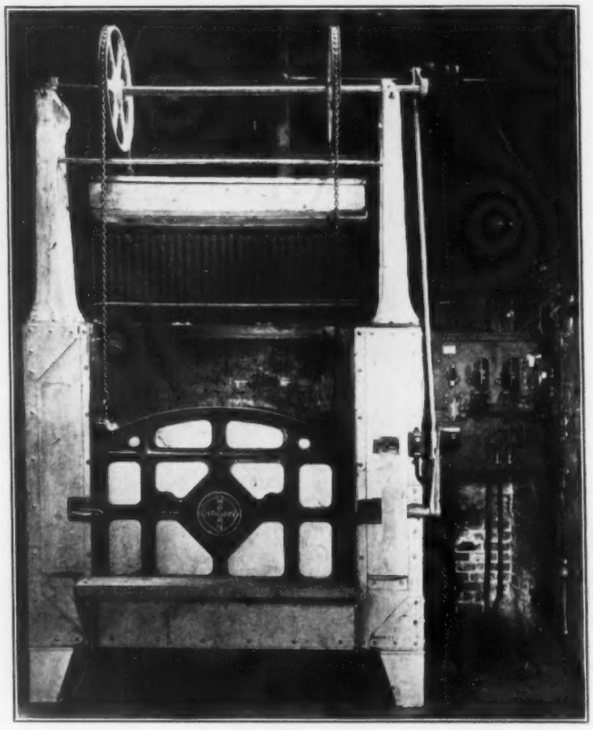
Chief among the advantages cited by the furnace operator is the reduction in warpage due to the even temperature distribution. In the manufacture of the large line of speed-reducers for which this company is noted this is an important factor. Reduction in the quantity of scale on treated pieces is another major advantage. The automatic time and temperature control possible with electrically heated equipment has resulted in lowered operating costs. Less time and attention are required for a given job and overtime has been practically eliminated. The furnace is loaded at night, the time switch is set and when the operating crew arrives in the morning the charge is ready to be removed.

The furnace is equipped with Wilson-Mauelen automatic temperature control equipment and a Westinghouse panel board.

### Brass-Melting Furnaces

For the melting of brass and bronze the electric furnace rapidly is replacing other types of fuel-fired furnaces due to the economy of operation and accuracy of the electric type. Two such furnaces are giving satisfactory service in San Francisco. At the shops of the Market Street Railway there is installed a 250-lb. Detroit furnace operated from a 60-kva. special transformer delivering power at 90 volts to the electrodes. As is the case with practically all electric industrial heating equipment those responsible for the operation of this furnace pay high tribute to it. The following remarks by J. W. Delaney, superintendent of equipment of the Market Street Railway, are typical:

> The 250-lb. Detroit furnace which we installed in our brass foundry has proved an excellent investment.
>
> It replaced an oil-fired, open-flame furnace. The latter was extremely noisy. It was uncomfortable to operate in our small foundry due to the heat and fumes. The excessive melting losses (as high as 8 per cent) made it expensive to operate. The electric furnace eliminated these objections



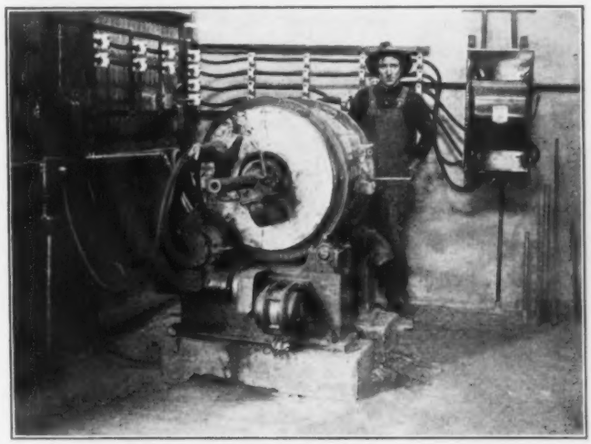
A 66-kw. Hagan heat treating furnace at the Pacific Gear & Tool Works, San Francisco.

and our actual losses in melting are now less than 1 per cent. The quality of our castings shows a noticeable improvement and we are turning out special bearing alloys which we had never been able to produce in the oil furnace.

We melt an average of 1,500 lb. of metal per day and have turned out as high as 3,900 lb. in 8 hours. The castings vary from very small curtain fasteners and other street-car hardware to trolley wheels, trolley ears and axle and armature

bearings and turnings, whereas we formerly purchased ingot metal and sold our shop scrap to the smelters at considerable loss.

The satisfactory operation of a similar 250-lb. Detroit furnace in the plant of the Pacific Electric Manufacturing Company has resulted in the placing of an order for a second furnace having a capacity ranging between 700 and 1,000 lb. The second furnace will be equipped with a 200-kva. transformer. The advantages of this

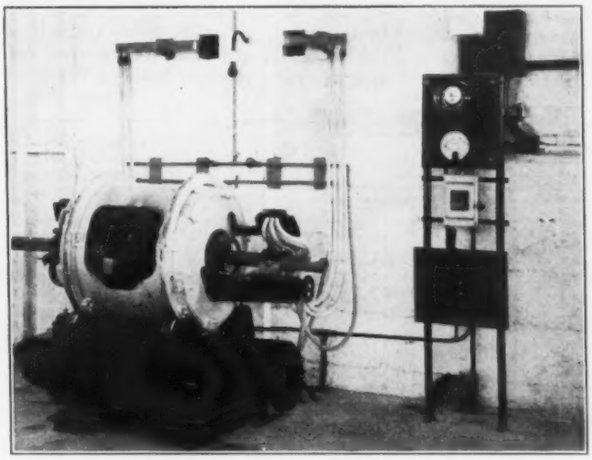


A 250-lb. Detroit brass furnace in the shops of the Market Street Railways.

type of equipment are well expressed in the following statement made by J. E. Holland, superintendent of the Pacific Electric factory:

The 250-lb. Detroit furnace which we installed about a year ago has been in constant service; has caused us practically no trouble; and has not been shut down even for relining. We have thus far melted 2,040 odd heats and the refractories are yet in good shape.

We are now regularly melting an average of nine 440-lb. heats per 8-hour day. On one occasion, we melted approximately 5,000 lb. in a little over 9 hours. Many of our castings are small and somewhat intricate. They are used exclusively in the manufacture of our high tension switch parts and



Satisfactory operation of this 250-lb. brass furnace at the plant of the Pacific Electric Manufacturing Company resulted in the ordering of a second furnace having a capacity of 700 to 1,000 lb.

must be sound and of accurate analysis. With the electric furnace, porous metal is a thing of the past and the castings we are getting could not be better.

Mr. Paine, our foreman, tells me he has worked in brass foundries continuously for over 40 years. He has operated every kind of furnace and used every form of fuel but he is now thoroughly converted to electric operation. Our equipment has already paid for itself on account of lower melting losses and saving in labor. Instead of employing a skilled melter, we use an ordinary intelligent laborer who, under the direction of the foreman, gets just as good or perhaps better results.

There is also installed at the Pacific Electric factory a 15-kw. Young Bros. coil-baking oven which is used for drying coils. This oven has eliminated previous difficulties due to moisture in the coils and has made possible a better product due to the ability to regulate the temperature accurately within limits of plus or minus five degrees.

### Installations of Welding Equipment

There are few manufacturing processes involving the use of steel or iron that do not permit the application of some form of electric welding. Two noteworthy installations of electric welding equipment have been made recently in San Francisco. A 50-kw. Taylor-Winfield miter butt-welder has been purchased by the Michel-Pfeffer Iron Works for welding window sash and for the production of standardized fabricated steel buildings. Similar equipment has been installed in the plant of the U.S. Metal Products Company.

### Laboratory Installations

The trend of industry toward electric heating is reflected in the recent additions of new equipment in the student foundry at Stanford University. A 125-lb. per hour Electromelt steel and iron furnace having a capacity of 125-kw. has been installed in the foundry as well as a 10-kw. Young Bros. core-baking oven. In the forge shop there has been installed a 27.5-kw. Hagan heat-treating furnace of the box type in addition to a Rockwell-Sentry dilatometer laboratory testing furnace.

At the U.S. Bureau of Mines Experiment Station at the University of California there has been installed an Ajax high-frequency induction furnace, the first of this type on the Pacific Coast. This furnace produces extremely high temperatures and has been used to melt tungsten, which has a melting temperature of 3,400 deg. C. This furnace has many applications in laboratory and experimental work.

Ten-kilowatt Young Bros. testing ovens have been purchased for the paint laboratories of R. M. Mason & Company and the W. P. Fuller Company. Both of these ovens are used for testing the quality and characteristics of various paints and varnishes manufactured by these two firms. Electric ovens have many advantages over other types for laboratory uses.

## Electric Fence Protects Right-of-way From Land Slides

Danger to travelers caused by land slides and track washouts due to heavy storms has been completely eliminated by a newly perfected electric fence, according to W. E. Boland, signal engineer for the Southern Pacific Company. The fence is electrically connected, lightly built in 12-ft. panels, firmly anchored at either end, and placed in circuit with the block signal system. It has been constructed above the railroad right-of-way wherever there is any possibility that unusually heavy rains may loosen earth and cause slides. Any slide occurring would carry away the panel of fence in its path, breaking the electrical connection and automatically setting block signals that would stop any train approaching the potential danger zone.

# Engineering Practice

## Automatic Stations Checked via Telephone

### Ingenious Shop-Made Equipment Advises Nature and Extent of Troubles in Unattended Substations

AN automatic signaling device sending impulses over ordinary telephone equipment, thereby giving the service department an immediate review of station conditions incident to trouble or emergency, has been developed by the Northwestern Electric Company of Portland, Ore., for use in conjunction with its unattended automatic distribution substations. In the event of trouble conditions this equipment operates to raise the receiver on the station telephone thereby connecting the station with the operator on the company's private branch exchange who, in turn, will plug the call over to the service department. A series of buzzer or horn signals thus is communicated over the telephone line to the service department, advising that department of the condition of the important apparatus at the station in question, in the event of any line or system trouble. The signal system consists of three major parts: the code machine, the control relays, and the telephone equipment.

The equipment is simple in construction and operation, is rugged and not costly, and installations have proved eminently satisfactory.

The code machine together with the relay panel are shown in Fig. 1. The motor which drives the code contact drums is a common 12-volt d.c. motor (automobile generator) which operates from the station storage battery. Such motors commonly are used by the company for oil-switch tripping. Through a reduction gear this motor drives the code drum at a speed of 2 r.p.m. which in turn drives a reset-contact wheel, making contact every 15 min. The present finished design of this equipment utilizes a drum having 9 contact wheels, one of which is a solid wheel giving continuous contact and the others of which are toothed wheels which give intermittent contact. Each of the contact wheels has special contact teeth at the normal starting point, arranged to give the "station signal" regardless of which wheel or wheels may be sending impulses. In addition to these, the No. 1 contact wheel has one other ⅛-in. contact tooth, the No. 2 wheel has two, and so on, the No. 8 wheel having 8 contact teeth. The No. 0 wheel is the solid contact wheel as indicated in the diagram of Fig. 2.

Considering the eight contact wheels as a contact drum the contact teeth of the successive wheels are spaced progressively around the drum. Thus,

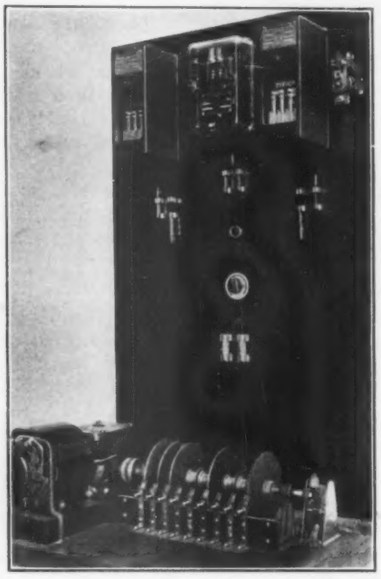


Fig. 1. View of shop-made signaling equipment which gives check of apparatus in unattended substations.

when the drum starts to rotate each wheel makes contact with its teeth in the proper progression with a silent or no-contact space between each successive group of signal impulses. The initial contact teeth on each of the contact wheels are provided for the purpose of giving the special signal for the station each time the drum begins a new revolution. Inasmuch as any one or perhaps several of the contact wheels may be sending out signals at the same time, it is necessary to have the station-signal contacts on each of the wheels in order that the station signal may be given regardless of which actually is making the signal contact at any particular time.

For each revolution of the contact drum, and following the station signal, the contact wheel No. 1 gives one dot for feeder No. 1, indicating, as explained later, whether the oil switch on that feeder is open or closed. Likewise, wheels Nos. 2, 3 and 4 operate for feeders 2, 3 and 4. Wheel No. 5 indicates the position of the 11-kv. oil circuit breaker, whether open or closed. Wheel No. 6 indicates the position of the line switch on the 11-kv. line No. 1, telling whether this switch is open or closed and likewise wheel No. 7 gives the same indication for 11-kv. line No. 2. With wheels Nos. 6 and 7 it is possible to tell from which line the station is operating at the moment. Contact wheel No. 8 gives an indication telling whether or not 2.4-kv. bus is energized.

The arrangement of the telephone end of the signaling equipment is shown in Fig. 3 which is largely self-explanatory. It may be noted that the equipment is outstandingly simple, consisting only of an automobile horn for the horn signal, a small buzzer for the buzzer signal and a solenoid control for operating the receiver hook on the tele-

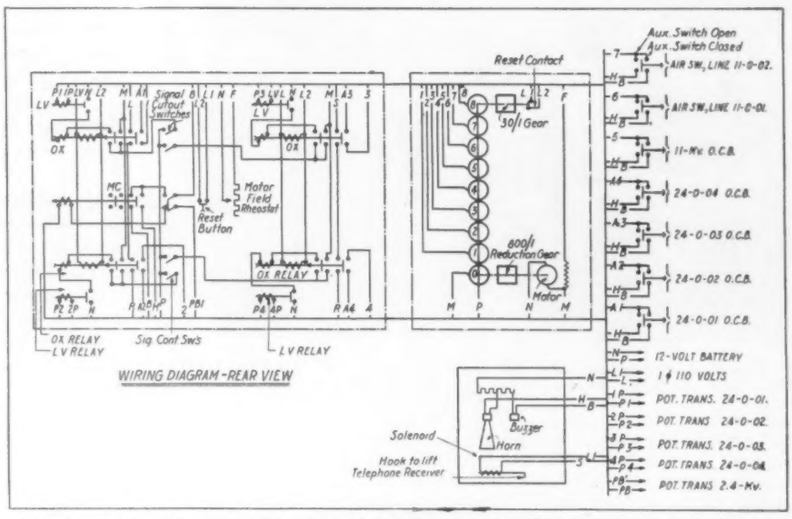



Fig. 2. Wiring diagram indicating scheme of control and sequence of operation of automatic signaling device.

phone itself. The solenoid is arranged in such a way that when it is de-energized the normal action of gravity operates to lift the telephone receiver hook which of course in turn signals the exchange operator.

The relay equipment is shown in part in Fig. 1 and is indicated completely in Fig. 2, and for further description can best be included in an outline of operations incident to a typical operation of the signaling equipment. It may be significant to note here that all the equipment operates from the 12-volt storage battery except where otherwise specifically noted.

A failure in voltage on any one or all of the 2.4-kv. distribution feeders will set in motion the signaling equipment. A relay connected across each of the 2.4-kv. line potential transformers is arranged for contact closing when de-energized. The operation of that relay energizes the release coil of the OX relay which, in reality, operates as an electrically operated 2-pole double-throw switch. There is one OX relay for each 2.4-kv. feeder served by the signal equipment installation. Such OX relay makes a contact which connects the contact fingers through an auxiliary switch on the oil circuit breaker, opens the 110-volt supply circuit of the solenoid which operates the telephone receiver hook, closes the motor driving circuit, and opens its own release-coil circuit. These connections may be traced out on the diagram of Fig. 2.

When the relay operation has progressed to this state, current then passes from the battery through the proper code-contact finger to the auxiliary switch on the oil circuit breaker. If that oil circuit breaker is open, the auxiliary switch will be in such a position

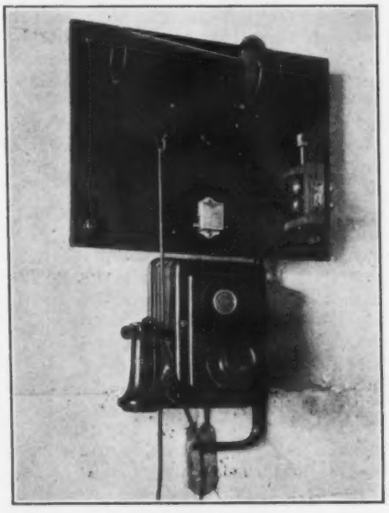


Fig. 3. Signal horn, signal buzzer, and receiver-lifting solenoid for automatic signaling equipment.

that the circuit to the signal horn will be closed and the sequence of signals on the particular contact wheel relating to the particular feeder in trouble will be given out by the horn. If that particular oil circuit breaker is closed, the auxiliary switch will be in such a position that the signal impulses will be given out by the buzzer instead of the horn. Inasmuch as all of the 2.4-kv. feeders are equipped with automatic reclosing devices, signal wheels Nos. 1, 2, 3 and 4 will operate only on those feeders on which the voltage has failed for some reason or other.

Once the signaling equipment has been started in operation, the station code signal and signals Nos. 5, 6, 7 and 8 always operate. Signals 5, 6 and 7 operate the buzzer if the particular switches which they represent are closed and operate the horn if the same switches are open. Thus the position of oil circuit breakers may be checked and an immediate idea gained as to the probable source of trouble causing the voltage failure that has caused the signaling equipment to operate. Signal disks 5, 6 and 7 are connected directly from their contact fingers to auxiliary switches on their respective oil circuit breakers. Signal wheel No. 8 likewise operates the horn if the 2.4-kv. bus is dead and operates the buzzer if the same bus is energized. Signal disk No. 8 is connected to a relay which makes one contact when the bus is energized and a different contact if the bus is dead.

As before stated, once the signaling equipment is started in operation it will continue for 15 min. at which time the reset contact will close energizing the operating coils on all of the OX relays. Thus the motor circuit is opened, the release-coil circuit is closed preparatory for the next voltage failure, the telephone solenoid circuit is closed and the contact-finger signal circuit is opened. If voltage has been restored to all of the feeders the equipment then will come to rest until the next failure. However, if any of the no-voltage relays are not closed in that instant, the signaling device will launch automatically upon another 15-min. period of operation. Pumping is prevented by the ninth wheel which has a notch where a contact finger opens the motor circuit after the reset contact has opened.

There is one trouble signal which was not designed for, but which added an additional valuable signal. The station power in these automatic substations is connected to the 11-kv. incoming lines and if a fuse burns out or if this incoming power fails, the telephone control solenoid is operated lifting the receiver and thus calling the exchange operator, but, due to the lack of power, there is no audible signal as otherwise would be the case. This particular kind of trouble happened to be the first to occur after the signal device had been installed.

Perhaps the accompanying chart of typical signals and their interpretation will assist in a better understanding of the operation of the signal equipment just described. As the station normally will operate on 11-kv. line No. 1 and will be automatically selective for transfer to 11-kv. line No. 2 in event of the failure of line No. 1, the accompanying signal data is assumed for the condition of 11-kv. line No. 1 as normal operation.

**CASE I.—System failure, or 11-kv. supply to station fails, but no switch operations at station: all four no-voltage relays will operate and the signal sequence will be:**

| Equipment | Signal Impulse | Signal Heard | Indicating |
|---|---|---|---|
| Station Code | — — — | On horn and buzzer | Station signaling |
| Feeder No. 1 | - | On buzzer | O.C.B. closed |
| Feeder No. 2 | - - | On buzzer | O.C.B. closed |
| Feeder No. 3 | - - - | On buzzer | O.C.B. closed |
| Feeder No. 4 | - - - - | On buzzer | O.C.B. closed |
| 11-kv. O.C.B. | - - - - - | On buzzer | O.C.B. closed |
| 11-kv. Line No. 1 | - - - - - - | On buzzer | Sw. closed (on normal operation). |
| 11-kv. Line No. 2 | - - - - - - - | On horn | Sw. open (normal for emergency line). |
| 2.4-kv. Bus | - - - - - - - - | On horn | Bus dead (will change to buzzer when voltage comes back.) |

**CASE II.—No. 2 2.4-kv. feeder opens by action of overload relays, station otherwise normal, feeding from Line No. 1. Then signals will be:**

| Equipment | Signal Impulse | Signal Heard | Indicating |
|---|---|---|---|
| Station Code | — — — | On horn and buzzer | Station signaling |
| Feeder No. 1 | No signal, OX relays did not operate. | | |
| Feeder No. 2 | - - | On horn / On buzzer, if and after O.C.B. closes | O.C.B. open |
| Feeders 3 and 4 | No signal, OX relays did not operate. | | |
| 11-kv. O.C.B. | - - - - - | On buzzer | O.C.B. closed |
| 11-kv. Line No. 1 | - - - - - - | On buzzer | Sw. closed (on normal operation) |
| 11-kv. Line No. 2 | - - - - - - - | On horn | Sw. open (normal for emergency line) |
| 2.4-kv. Bus | - - - - - - - - | On buzzer | Bus energized |

**CASE III.—11-kv. Line No. 1 fails, station otherwise normal. Then signals will be:**

| Equipment | Signal Impulse | Signal Heard | Indicating |
|---|---|---|---|
| Same as for Case I, except: | | | |
| 11-kv. Line No. 1 | - - - - - - | On horn | Sw. open (line automatically opened at station) |
| 11-kv. Line No. 2 | - - - - - - - | On buzzer | Sw. closed (line automatically closed at station) |
| 2.4-kv. Bus | - - - - - - - - | On buzzer | Bus energized |

# Transmission Towers Cleaned and Painted With Compressed-Air Equipment

POWER equipment has replaced hand methods in the cleaning and painting of transmission towers on the system of the Pacific Gas and Electric Company. For the most part the towers used in that system are of galvanized steel, but there are several crossings over waterways where it is necessary to use very high towers, the highest of these towers being some 460 ft. The length and weight of the members and the fabrication by riveting instead of bolting in these high towers, and other factors, make galvanizing impracticable, thus necessitating a protective coating of red lead and graphite paint to prevent corrosion. Until about a year ago the company used an ordinary steel-wire hand brush to clean the steel and applied the paint also by hand brush. This method now has been replaced completely with a compressed-air sand blast and compressed-air paint gun.

This equipment in operation on a 250-ft. crossing tower along the bay shore north of San Francisco is shown in the accompanying illustrations. The sand tank weighs about 250 lb. and was made especially for this kind of work. Its capacity is about 3 sacks of sand, an amount sufficient to last for about 45 min. The cheap cast-iron spray nozzle used for this work has a life of about 45 min., or one charge of sand, and hence the nozzle usually is changed while the sand supply is being replenished. To minimize the delay in the sand blasting operation and to avoid lowering the sand tank itself to the ground each time refilling is necessary, an extra charge of sand is kept on hand up in the tower in a special canvas bag. This canvas bag is a circular affair with a funnel-shaped outlet to aid in dumping the sand charge into the sand tank. With this arrangement it is possible for the man who attends to the sand-tank end of the equipment to lower the sand bag to the ground for refilling while the sand-blast operator proceeds with his work.

To take full advantage of the very excellent cleaning job done by the sand-blasting equipment and to avoid the possible formation of new corrosion between cleaning and painting operations, all of the cleaned surfaces are painted the same day they are cleaned. As soon as the tower surface has been cleaned of all scale and rust a coat of red lead is applied by means of an air brush. Subsequently two coats of graphite paint are applied in the same way.

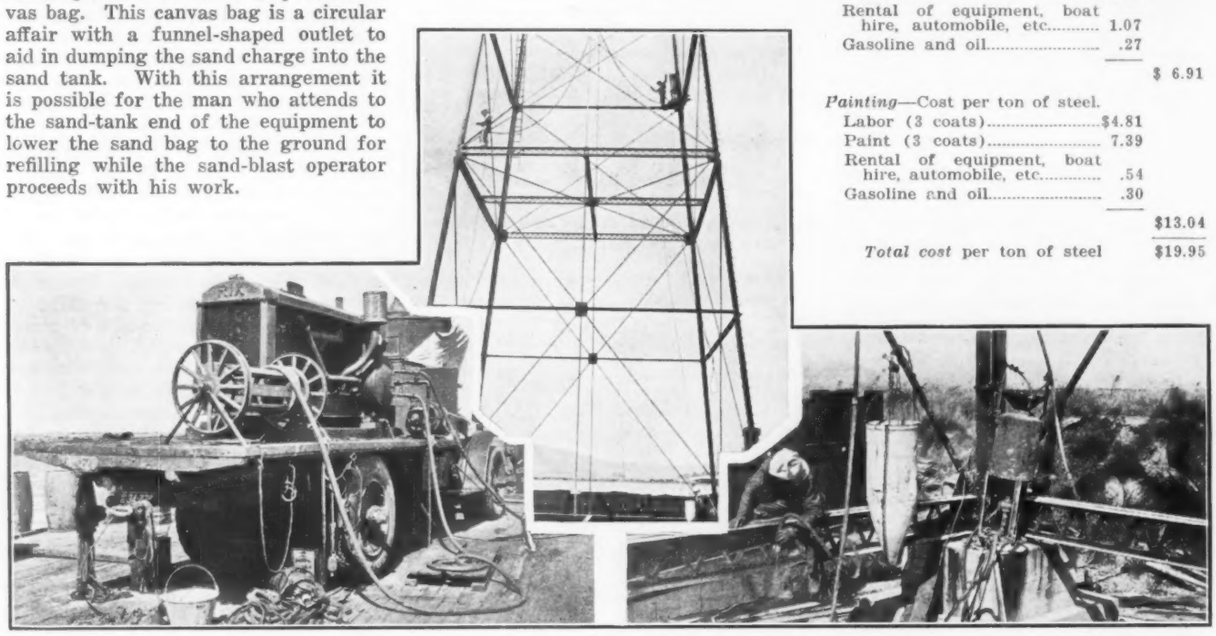
A gas-engine-driven compressor set mounted on an automobile truck furnishes air at 100-lb. pressure to the sand blasting and the painting equipment. About 300 ft. of air hose is provided to enable the tower to be reached even though it is impossible to get the truck immediately to the base of the tower. In many cases the towers to be cleaned and painted in this manner are located adjacent to navigable waterways and are inaccessible directly by motor truck. In these cases the truck with its equipment is mounted on a barge as shown in the accompanying illustration and the equipment thus transported to the tower. In many cases it is possible to anchor the barge close to the tower, leaving the truck and its compressor equipment on the barge during the cleaning operation. Power driven winches on the compressors operate light steel lines which are strung through snatch-blocks attached to the tower base, thus serving to haul the sand blasting equipment, sand supply and painting equipment up and down the tower as may be needed.

Experience has shown that only coarse and sharp sand is satisfactorily effective for the sand-cleaning of towers. Initial attempts at reclaiming part of the sand after it was used brought out the fact that the used sand was so badly broken up that its abrasive powers were lost. Impingment at high velocity against the steel and the cutting action in removing the scale completely exhausted the usefulness of any one charge of sand in one operation.

From a cost standpoint the tower cleaning as accomplished by the sand blast versus that previously accomplished by the hand-brush method is not directly comparable, because the sand blast results in a far more thorough and effective cleaning. The application of paint by means of the air brush of course is somewhat wasteful of paint but the additional cost of paint required is far more than offset in the reduced labor cost. The thoroughness of the cleaning job and the thoroughness of paint application by means of the air brush is expected to eliminate practically completely the scaling formerly encountered and thus it is expected that it will be necessary to repaint towers no more frequently than perhaps every eight or ten years. In the past it has been found necessary to clean and paint steel towers located in the fog region adjacent to San Francisco Bay every four or five years. Thus a decided economy is expected through the use of the air pressure equipment.

In the following tabulation are given the costs per ton of steel cleaned and painted by the air-blast method, the costs shown being only the field charges and **not including** overhead expense:

| | | |
|---|---|---|
| *Sand Blasting*—Cost per ton of Steel. | | |
| Labor | $4.21 | |
| Sand | 1.36 | |
| Rental of equipment, boat hire, automobile, etc. | 1.07 | |
| Gasoline and oil | .27 | |
| | | $ 6.91 |
| *Painting*—Cost per ton of steel. | | |
| Labor (3 coats) | $4.81 | |
| Paint (3 coats) | 7.39 | |
| Rental of equipment, boat hire, automobile, etc. | .54 | |
| Gasoline and oil | .30 | |
| | | $13.04 |
| *Total cost* per ton of steel | | $19.95 |



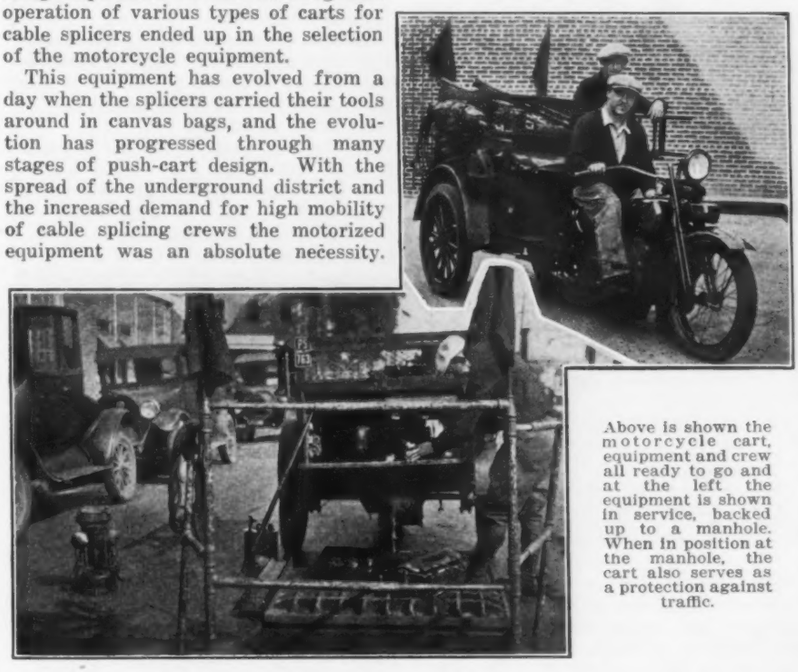
Equipment and methods used in sand cleaning and spray painting transmission towers on Pacific Gas and Electric Company system. Left—truck-mounted compressor. Center—at work in the tower; note the canvas bag has been lowered for a charge of sand. Right—close-up of equipment.

# Cable Splicers Use Motorcycle Cart for Transportation and as Workshop*

By Z. T. PETTIT, Underground Engineer, Los Angeles Gas and Electric Corporation Los Angeles.

MOTORCYCLE carts have been adopted as standard equipment for the cable splicing crews of the Los Angeles Gas and Electric Corporation. These simple and extremely flexible vehicles are used for the transportation of both men and materials. They are easy to handle under conditions of heavy traffic, reasonable as to first cost and economical to operate and maintain. Long experience in the building and operation of various types of carts for cable splicers ended up in the selection of the motorcycle equipment.

This equipment has evolved from a day when the splicers carried their tools around in canvas bags, and the evolution has progressed through many stages of push-cart design. With the spread of the underground district and the increased demand for high mobility of cable splicing crews the motorized equipment was an absolute necessity.



Above is shown the motorcycle cart, equipment and crew all ready to go and at the left the equipment is shown in service, backed up to a manhole. When in position at the manhole, the cart also serves as a protection against traffic.

Serious investigations into the relative first cost, operating economy, maintenance charges, depreciation and operating flexibility of various kinds of motorized apparatus preceded the present standard for this service.

There are six outstanding advantages in the use of the motorcycle equipment:

1. Better workmanship is obtained, for the splicer would rather drive a motorcycle than push a cart.
2. Each splicer has a means of transportation for his men and material.
3. The outfit is compact, thereby lessening traffic congestion. It is easy to manipulate in traffic, and due to the pecularity of design commands the attention of traffic officers and sometimes gains road favors.
4. The outfit is backed up to the manhole or vault and by lowering the back board the helper has the advantage of a well kept tool box and work bench, as well as the protection of a motor vehicle.
5. It does away with exposing company property to theft, damage and complaints.
6. It is indispensable for trouble work, as each splicer is equipped and ready for trouble service, thereby eliminating the necessity for stadby men and emergency wagons during the day.

A standard twin-cylinder Harley-Davidson motorcycle is used which develops about 10 hp. and furnishes plenty of power and speed. The cart itself is a wooden body covered with sheet metal to give proper rigidity and protection from road abuse. The body is entirely enclosed and about 42 in. wide, 47 in. long and 26 in. deep. This space is divided into two compartments, with drawers and off-sets to adapt it to tools and equipment, is waterproof, and may be locked. On the top of this box is a wire mesh frame 12 in. high which forms an open body space of 41½ x 33½ in. for the purpose of carrying material and equipment not normally carried with the splicers' tools. On the enclosed section is a seat where two men may ride comfortably.

The body of the car is mounted on a vanadium steel axle carrying two standard 30 x 3½-in. Ford wheels. The body rests astride the rear wheel of the motorcycle and is equipped with the proper braces, shafts and supports for attachment to the motorcycle frame. A shaft arrangement to pull the cart is attached to the motor support bars behind the front wheel forks. Every part is so designed as to give the motorcycle as little vibration as possible, and the cart itself is made to stand load and road abuse. The outfit has a total overall length of 10 ft. 3 in. from tip to tip.

The machine has a load-carrying capacity of 750 lb. Normally the load carried is a complete splicers' outfit, consisting of a set of tools, protective devices, ladders, opening tools, manhole guards, and material for the day's work. The splicer also carries his two helpers with him, thereby furnishing transportation facilities also,

The motorcycle cost is $375 complete with all necessary extras and accessories. The body built and attached costs $360, making the complete initial cost $735. From past experience it has been found that the maintenance cost of the motorcycle and cart is approximately $84 per year. Depreciation of the outfit is approximately 25 per cent per year, but it is safe to say that with proper attention and repairs the equipment is good for five years or more.

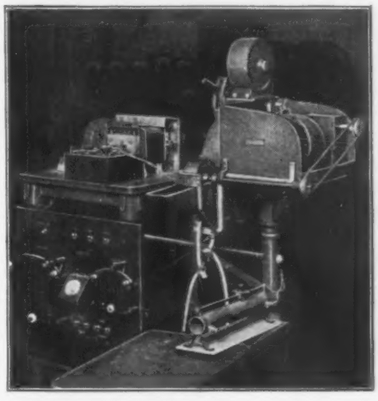
* Abstract from a report presented to the Underground Systems Committee, P.C.E.A., 1927.

## Range-Finding Apparatus Now Is Used on Ocean Cables

The "string oscillograph" was designed to locate German guns as an aid in directing Allied artillery fire, and it proved amazingly effective on the western front. By means of a microphone placed in an advanced listening post and another farther to the rear, measurements were taken of the time required for the sound of the explosion to travel between the two points and the gun's position then was determined by triangulation.

Today the "string oscillograph" is used to record electrical impulses on transatlantic cables to determine whether signals received are sufficiently distinct to actuate the receiving relays properly. It also is used to detect local faults in the cable transmitting apparatus, and to isolate any foreign electrical disturbances which may appear on the cable.

The instrument was developed in the laboratories of the Western Electric Company and consists essentially of a "string galvanometer" and a high-speed photographic unit. Each pulsation of current is recorded photographically on a reel of motion picture film of sensitized paper, which gives a graphic representation of the electrical signals received.



String oscillograph for cable testing.

Besides providing an infallible test for incoming and outgoing signals, the graphic representation of electric currents enables cable experts to detect such foreign disturbances as may arise from lightning, "earth currents" or power lines, which sometimes affect cables near land.

# Analysis of Current Transformer Tests—X

## A Discussion of Meter Connections

By E. C. GOODALE, Tacoma, Washington

THE standard, well-known method of metering a 3-phase 3-wire circuit is as shown in Fig. 33. All voltage arrows (open-headed) indicate the assumed directions of the **induced** voltages and all current arrows (solid headed) indicate the assumed directions of current flow. The relative times at which they are in their indicated directions are shown in Fig. 34(A) for the case of a 3-phase balanced load at unity power factor. Line voltages have been assumed as 10 kv. and line currents as 300 amp. each. The potential transformer ratio will be 100/1 and the current transformer ratio 60/1. Hence the transformation ratio will be 6,000/1.

It may be noted (Fig. 33) that in the secondary potential circuit the voltage arrows on the potential coils of the watthour meter are pointing from right to left, whereas the current arrows of the current coils point from left to right. The reason for this is, as explained in Article VIII in the December, 1927, issue of Electrical West, due to the fact that the potential coil of the meter really is a load. Hence the induced voltage or voltage drop is assumed in a direction opposite to that of the current energizing it. That is, the small amount of current which actually flows through the potential coil is assumed to be flowing from left to right, the same as the current through the current coil. The point of highest potential is always at the tip of the arrow, and hence in this case is at the left. In a source the current flows from low to high potential (agreeing with the votage arrow) but in a load the flow is from high to low potential, hence opposite in direction to that of the voltage arrow. In an autotransformer, which really is a combination of a load (primary) and a source (secondary), the assumed direction of flow is made to agree with that of the rest of the circuit.

In any a.c. wattmeter or watthour meter the registration of each element is equal to the voltage multiplied by the "power component" of the current, multiplied again by the transformation ratio.

In this case the secondary voltage would be 100 volts, the currents themselves 5 amp. each and the transformation ratio 6,000. The "power components" of the current, however, would depend upon the phase relations between the current in each element and its corresponding voltage. These phase separations between current and voltage in each element are 30 electrical degrees for a watthour meter connected to a line as shown in Fig. 33 and metering a pure resistance, or unity-power-factor load. As the power factor of the load varies, these angles vary as shown in the vector diagrams of Fig. 34. Hence the power registered on the elements will vary in direct proportion to the variation of the power components of their currents with respect to their voltages.

Fig. 34(B) shows these phase relations and the corresponding power components of the currents for a unity-power-factor load. Current $I_c$ works with voltage $-E_2$ at an angle of 30 deg. in the top element. Hence its power component is $5 \times 0.866 = 4.33$ amp. (0.866 is the cosine of 30 deg.) The power component of any current with

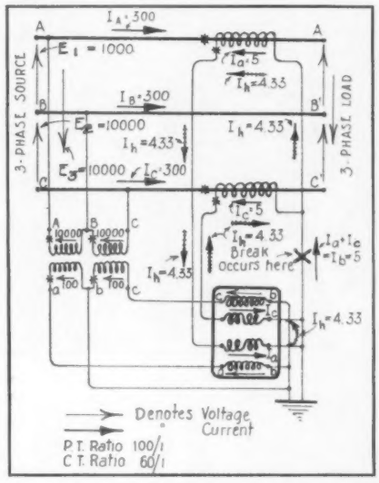



Fig. 33. Common watthour-meter connection scheme. This diagram serves as the basis for the vector diagrams of Fig. 34.

respect to its voltage is obtained graphically by dropping a perpendicular from the tip of the current vector to the voltage vector at an angle of 90 deg. with the latter. The distance from the common heel of the current and voltage vectors to the point where this perpendicular cuts the line of the voltage vector is (on the same scale as the current) the "projection" of the current onto the voltage, or is its power component with respect to that voltage.

If this projection or power component points in the same direction as the voltage, it is positive and the wattmeter or watthour meter will register forward in proportion to the relative length of this projection. If it points in the opposite direction the registration will be backward by the corresponding amount.

The power component may be obtained numerically by multiplying the current by the cosine of the angle by which it lags or leads the voltage. For all angles between 0 deg. and plus or minus 90 deg. (that is, 90 deg. leading or lagging) the cosine is positive and hence the power component is positive. For all angles between plus or minus 90 deg. and plus or minus 180 deg. the cosine is negative and hence the power component is negative, the registration accordingly being in the reverse direction. It should be remembered that its value may be determined graphically without using the cosine value by simply scaling the length from the common heel to the point where the perpendicular from the tip of the current vector to the line of the voltage vector crosses this line. This is illustrated in the accompanying diagrams.

The total power registered on the top element at unity power factor is, then:

$-E_2 \times I_c \times \cos.\ 30\ \text{deg.} \times 6{,}000 = 100 \times 5 \times 0.866 \times 6{,}000 = 2{,}598{,}000$ watts.

While on the bottom element it is:

$E_1 \times I_a \times \cos.\ 30\ \text{deg.} \times 6{,}000 = 100 \times 5 \times 0.866 \times 6{,}000 = 2{,}598{,}000$ watts.

The total is, then, 5,196,000 watts or 5,196 kw. By using the factor of 6 instead of 6,000 the result will be in kw. instead of in watts.

Instead of working with the cosine of the angle the power component may be used direct and also the factor 6 may be used instead of 6,000 to get the results in terms of kw.

In the top element, at unity power factor: $100 \times 4.33 \times 6 = 2{,}598$ kw.

In the bottom element at unity power factor: $100 \times 4.33 \times 6 = 2{,}598$ kw.

Total of both elements at unity power factor: $2{,}598 + 2{,}598 = 5{,}196$ kw.

If the load is drawing a current which lags its voltage in each case by 30 deg. the load power factor will be 0.866. Fig. 34(C) shows the corresponding 30-deg. lag of the metering currents behind their unity-power-factor positions and their power components at these angles. The current in the top element now is in phase with its voltage while that of the bottom element has dropped to a position 60 deg. behind its voltage. Hence the power registered in the top element at 0.866 power factor lag will be $100 \times 5 \times 6 = 3{,}000$ kw.

While the power registered in the bottom element at 0.866 lag is: $100 \times 2.5 \times 6 = 1{,}500$ kw.

And the total power at 0.866 lag: $3{,}000 + 1{,}500 = 4{,}500$ kw.

If the load power factor drops to 0.5 lag, corresponding to a lag angle of 60 deg. the current in the top element will drop back to an angle of 30 deg. behind the voltage and that in the bottom element to 90 deg. behind its voltage. The power registered therefore will be proportional to the power components shown in Fig. 34(D).

Power in top element at 0.5 lagging power factor: $100 \times 4.33 \times 6 = 2{,}598$ kw.

Power in bottom element at 0.5 lagging power factor: $100 \times 0 \times 6 = 0$ kw.

Total power registered at 0.5 lagging power factor: $2{,}598 + 0 = 2{,}598$ kw.

If the load power factor were to drop to 0, corresponding to 90 deg. lag, the current in the top element would lag its voltage by 60 deg. and hence its power component be 2.5 amp. as shown in Fig. 34(E). The current in the bottom element then would be in a reverse direction with respect to its voltage, lagging it by 120 deg. and the corresponding power component negative in value, being —2.5 amp.

At 90 deg. lag, or zero power factor, then, the registration in the top element would be: $100 \times 2.5 \times 6 = 1{,}500$ kw.

In the bottom element at 90 deg. lag: $100 \times (-2.5) \times 6 = -1{,}500$ kw.

Total at 90 deg. lag: $1{,}500 - 1{,}500 = 0$.

Suppose, however, that the secondary common current lead were broken as at X in Fig. 33. Under these conditions the two current transformer secondaries are in series, "bucking," and the current $I_h$, thus flowing through both current transformers, if assumed in the direction indicated by the cross-hatched arrows of Fig. 33, will be the vector-average-difference of the currents in their primaries, divided by the ratio. That is, $I_h = \frac{1}{2}$ [$I_A - E_C$ (vectorially)], divided by the current transformer ratio. This is in accordance with the "vector-average" law previously discussed.

Since the primary voltages and current transformer ratios both are high, the high reactance voltage built up on the secondary will be relatively very low on the primary side. For example, if it were 3 kv. across the secondary it would be $\frac{3{,}000}{60} = 50$ volts across the primary of each current transformer. This would be only 0.5 per cent of the primary line voltage. Hence the voltage on the load side of the current transformers would be practically the same as before and hence the load be unaffected. This, of course, is true only provided the current transformer windings do not break down due to the combination of heat from the high core losses and relatively high secondary voltages.

For the case of a balanced load at unity power factor this vector-average secondary current would flow in a positive direction through the bottom element, but in a negative direction through the upper element. Therefore, since it is lagging the lower element's voltage by 60 deg., it will have a power component of 0.5 times its value. Its value is found, by scaling the diagram, to be equal to 4.33 amp., hence its power component with respect to the lower element's voltage, $E_1$, will be 2.165 amp. See Fig. 34(F).

Since it goes in a reverse direction through the upper element, $I_h$ is reversed and its power component is found with respect to the upper element's voltage, $-E_2$. It also has a positive power component of 2.165 amp.

Hence the power registered at unity-power-factor load and with the lead broken as at X (Fig. 33) will be:

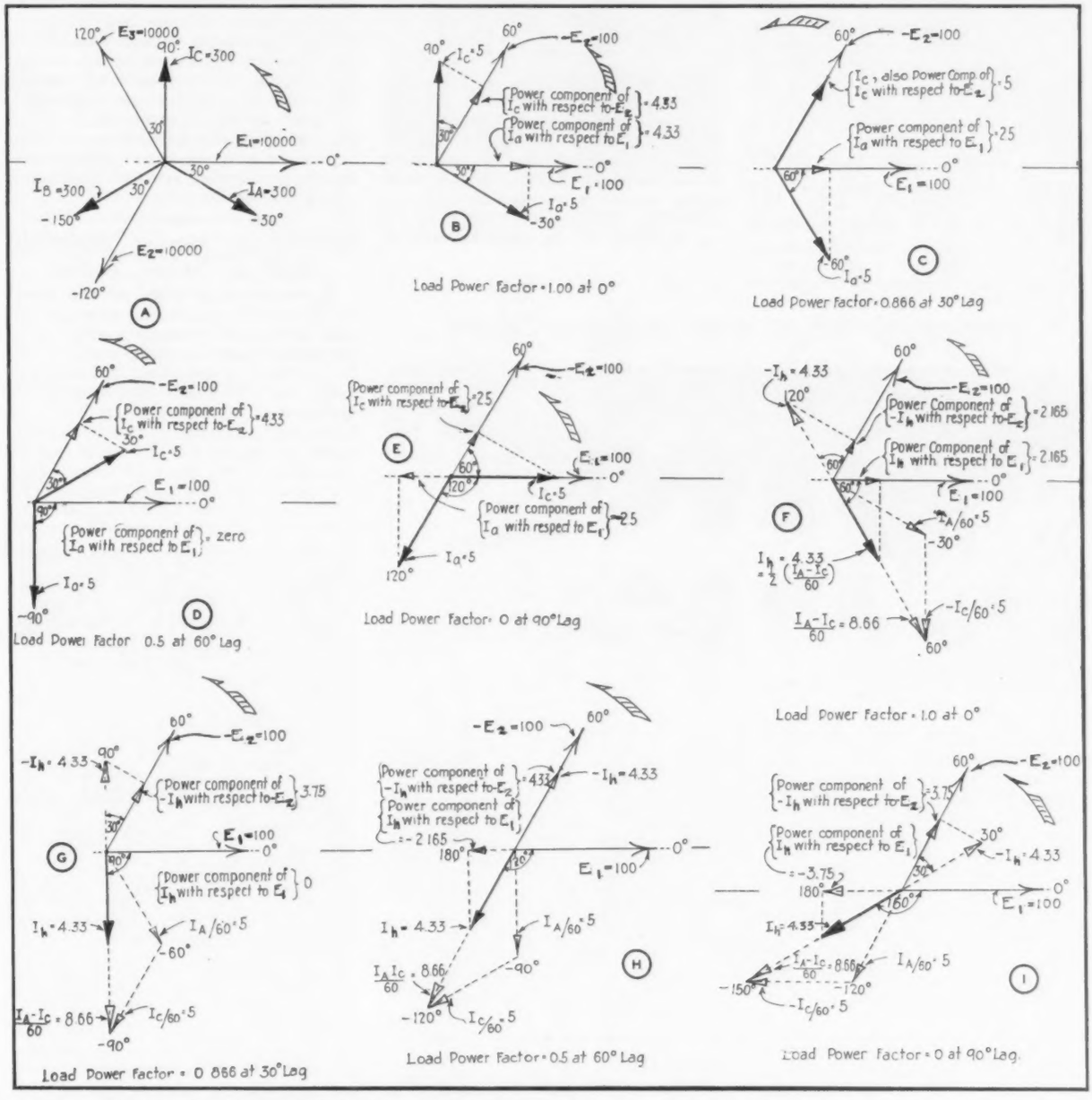

A
B
C
D
E
F
G
H
I
Load Power Factor = 1.00 at 0°
Load Power Factor = 0.866 at 30° Lag
Load Power Factor = 0.5 at 60° Lag
Load Power Factor = 0 at 90° Lag
Load Power Factor = 1.0 at 0°
Load Power Factor = 0.866 at 30° Lag
Load Power Factor = 0.5 at 60° Lag
Load Power Factor = 0 at 90° Lag

Fig. 34. Vector diagrams based upon connection scheme of Fig. 33, and showing the effect of various conditions.

Upper element: $100 \times 2.165 \times 6 =$ 1,299 kw.

Lower element: $100 \times 2.165 \times 6 =$ 1,299 kw.

Total: $1,299 + 1,299 = 2,598$ kw., which is ½ of 5,196, the true power.

With the load power factor 0.866 at 30 deg. lag, the power component on the upper element becomes 3.75 amp. and on the lower element is zero, as illustrated in Fig. 34(G). The corresponding registration will be:

Upper element: $100 \times 3.75 \times 6 =$ 2,250 kw.

Lower element: $100 \times 0 \times 6 = 0$.

Total: $2,250 + 0 = 2,250$ kw., which is just ½ of 4,500, the true power.

When the load is lagging still further, to 60 deg. at a power factor of 0.5, the power component on the upper element will be 4.33 amp. since $-I_h$ then is in phase with $-E_2$ and hence is its own power component. The power component in the lower element will be negative in value since $I_h$ thus is lagging $E_1$ by more than 90 deg., actually 120 deg. Hence it will be —2.165. These are shown in Fig. 34(H). The registration:

Upper element: $100 \times 4.33 \times 6 =$ 2,598 kw.

Lower element: $100 \times (-2.165) \times 6 = -1,299$ kw.

Total: $2,598 - 1,299 = 1,299$ kw., which again is ½ the true power, 2,598 kw.

Fig. 34(I) shows the derivation of the power components at a 90-deg. lagging load, zero power factor. The power component on the upper element then is 3.75 and on the lower is —3.75, with registration:

Upper: $100 \times 3.75 \times 6 = 2,250$ kw.

Lower: $100 \times (-3.75) \times 6 = -2,250$ kw.

Total: $2,250 - 2,250 = 0$, which again may be considered as ½ of zero, the true registration.

It is apparent then that when the lead is broken in the common current conductor as at X (Fig. 33), the meter will register just 50 per cent of the actual power passing through the line to the load, at any power factor.

EDITOR'S NOTE: This is the tenth of a series of articles based upon actual tests of various instrument transformer connections as made by the author in the meter testing laboratory of the Syracuse Lighting Company of Syracuse, N. Y. The next article will deal with voltage transformers and autotransformers.

**Electric shovels** are finding their way into urban construction to the eminent satisfaction of all parties concerned. Through their use the nerves of those who live or work in the vicinity of new real estate developments or other public improvements such as highways and bridges or large buildings no longer are shattered by the violent escape of steam, to say nothing of the release from soot and smoke. Also, the power industry is benefited through the use of electrical energy and the contractor's labor bill is reduced at least to the extent of one fireman, the cost of fuel transportation and time lost waiting for steam pressure. Equipped for complete and flexible control and built for ample operating speed under the severest conditions the electric shovel meets a definite construction need.

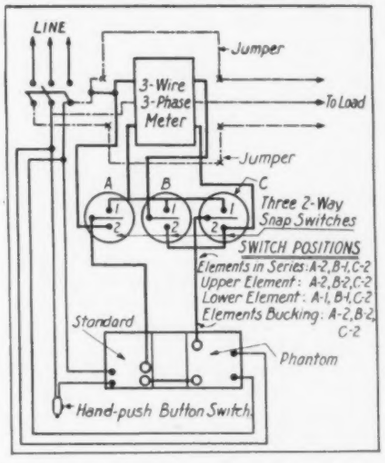
## Condenser Vacuum Improved by Cleaning

Among the many small items that contribute materially to the operating efficiency of a steam plant is that of keeping the condensers in top-notch condition. V. E. Johnson, superintendent of the San Bernardino steam plant of the Southern Sierras Power Company at San Bernardino, Calif., improved the vacuum in the condensers in his plant to the extent of 1.3 in. by rearranging the condensers slightly to accommodate a modern condenser head in place of the old-type head. This change, in addition to a vigorous cleaning of the tubes by means of a motor-driven wire brush, resulted in the increased efficiency.

## Snap-Switch Device Simplifies Watthour Meter Testing

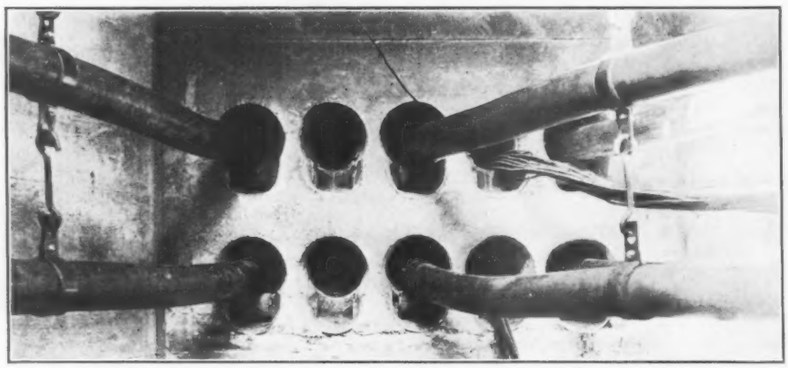
A meter-testing switch arrangement which greatly reduces the time necessary in making a complete check on a polyphase meter has been made up by R. E. Floyd, a meterman at Lewiston, Idaho, for the Pacific Power & Light Company. This device, which is shown in the accompanying illustrations, comprises principally a 3-pole knife switch and three 2-way snap switches. The connection diagram is self-explanatory.

The use of this device enables the meterman to make a complete meter test, including a check on the accuracy for non-inductive loads, a check on the accuracy at 50-per-cent power factor and a check for balance between the meter elements, in very little more time




Wiring diagram of snap-switch circuit-control device for meter test.

## Preventing Sheath Wear on Large Cables



Where heavy, lead-covered cables are run right through manholes or transformer vaults there arises the problem of supporting these cables in a manner that will prevent abrasion of the sheath and that will avoid strains and unecessary bends. A method that has been devised and extensively used by F. L. Rohrbach, underground superintendent of The Washington Water Power Company, Spokane, is shown in the accompanying illustration. It may be noted that the method of construction utilizes two particular features. One of these is the rubber-covered roller supports built into the duct-ends and the other is the attachment of overhead supports to carry the cables across the span of the manholes. The roller duct-ends prevent the usual sheath abrasion at those points and were described at length on pp. 222-223 of the Journal of Electricity for March 15, 1926. The hangers obviate the necessity of bending the cables over to a point where they can be supported on the side walls. The cable hangers are insulated from the cable sheath and carry the cable weight directly to the roof of the hole. The particular installation shown in the accompanying illustration is one of those at the new Chelan power house of The Washington Water Power Company and the six cables shown constitute the 3-phase, 11-kv. leads (two cables per phase) of one of the 24,000-kw. generators. Each cable is a 2,000,000-circ-mil, hemp-center cable, having an over-all diameter of 3.15 inches.

# Residence-Type Automatic Railway Substation

## Noiseless Operation Obtained by Ventilation Scheme and Method of Equipment Mounting

DUNBAR substation of the British Columbia Electric Railway Company, Ltd., is located in a rapidly growing, high class residential section of the city of Vancouver, B. C. Consequently the station had to be designed to be not only essentially sound-proof, but with exterior architecture that would harmonize gracefully with the best of the new residences that are being built on adjacent property. The satisfactory results obtained are illustrated, in part at least, in the accompanying illustrations.

Four special features were incorporated in the design of the building to reduce the operating sounds audible from the outside of the building. These four features were: (1) Omission of all windows and window openings; (2) Special treatment for soundproofing of walls, doors and roof; (3) Provision of special means of ventilation; (4) Omission of all fastenings, fittings and attachments from the inside walls.

A dead-air space between the inside walls and the main concrete wall of the structure and between the roof and the ceiling provides an effective sound-absorbing medium. Horizontal ground strips fastened to nailing strips embedded in the concrete of the station walls support a special padding of eel-grass. To the inner surface of this padding or quilting is attached ordinary metal lath which in turn is covered with a heavy coat of cement plaster. The ceiling was treated in a similar manner and thus virbrations occurring in the interior are not communicated directly to the main walls of the building.

There are only two doors provided in the building, one of these being the small "side entrance" which is used for all normal purposes and the large main "front" door which is large enough to permit the entry and removal of equipment. Each of these doors is of heavy wooden construction, made up of two layers of wood separated by eel-grass quilting. The front door is of the sliding type and is especially mounted in place to provide a very tight seal between the door and the casing and is not used except in the case of necessary equipment removal. The method of sealing the other door is similar to the method normally adopted for refrigerator doors and the results have been very satisfactory.

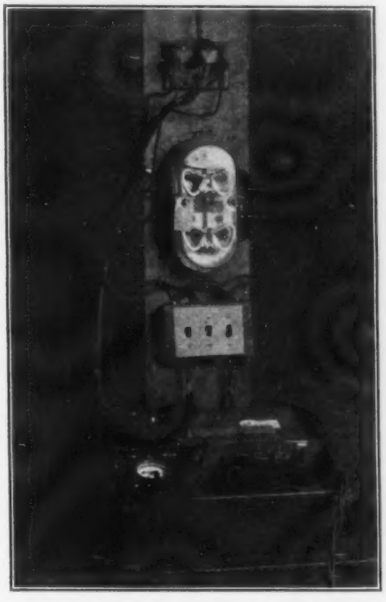
Dunbar automatic railway substation of the B. C. Electric Railway Co., Ltd.

Ventilation naturally becomes an important subject when a place of this character is so closely sealed up. To accomplish the necessary ventilation in the case of the Dunbar station, a slow-speed fan was installed in the basement with its intake or suction side connected to four metal-lined passageways which are brought up in the four interior corners of the building, and which terminate in rectangular openings immediately below the ceiling. Warm air thus is drawn from the upper portion of the room and passed through the fan to a large exhaust duct which terminates in a large opening in the outside wall of the building underneath the porch of the side entrance. Suitable baffles for reducing the transmission of sound are placed in the exhaust duct. This exhaust opening faces away from the streets at the intersection of which the substation is located. Cool air is drawn into the building through large openwork grills mounted in the bannisters of the front porch and is taken directly into the basement. Grated openings at suitable locations in the main floor of the building permit cool air to enter the operating room and circulate freely around the machinery and equipment before it passes to the ceiling and is drawn off. In the event of failure of the fans, carefully balanced shutters in the intake ducts operate automatically to open a warm-air exit upward through the four corner posts of the building, where it may pass out to the atmosphere.

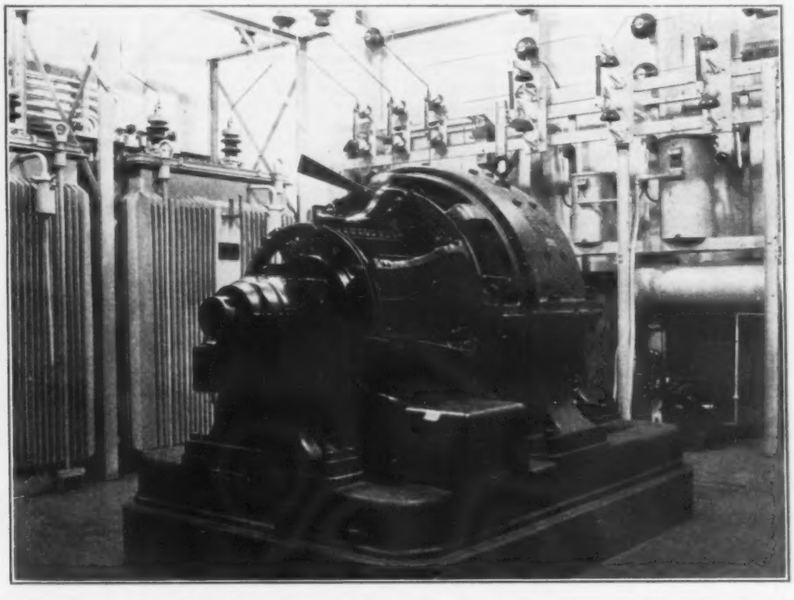
Further to reduce the transmission of sound to and consequently through the walls of the substation building, all mountings and bracings for switchboards, disconnect switch racks, cable leads and other equipment were so arranged as to avoid all connections to an outside wall.

---

than previously required to make only the non-inductive load test. With this arrangement, one hookup of the meter suffices for all of the tests and no time is lost in shifting connections for the various tests.



Complete meter testing equipment showing snap-switch control.



Interior of Dunbar 1,000-kw. station. Note that equipment is mounted free of walls.

# Ideas for the Contractor

## "Bargains in Convenience Outlets" in Denver

### Slack-Month Campaign Builds Up Wiring Business and Improves Trade Relations Between Co-operating Branches of the Industry

ON THE theory that practically everyone is a prospect for an additional convenience outlet in his home, and that the purchaser of a new one frequently overlooks the all important feature of adequate wiring, the Electrical League of Colorado set about to remedy this condition and to create as much additional wiring business for its members as possible during what is usually considered a rather quiet month —November.

This activity centered around a newspaper advertising campaign that was launched on the first day of November and continued throughout the month. Copy appeared in each of the four local papers every day with the exception of Saturdays and Sundays. Each advertisement included the names of all contractor-members of the league and featured a special price of $15.85 for the installation of three duplex convenience outlets during the 30-day period. A notice was included likewise to the effect that all wiring done by these contractors would be installed under the supervision of the municipal inspection department.

#### Establish Special Price

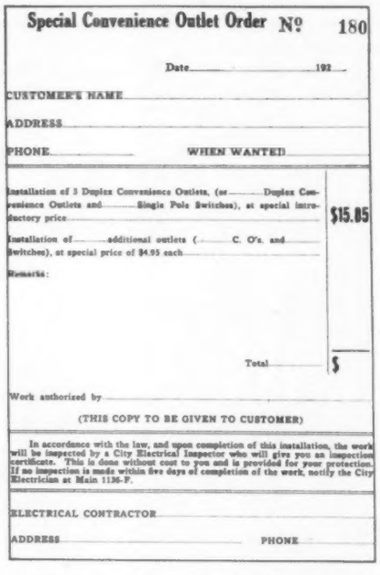
In order to enable contractor-members of the league to realize a profit on this additional work, the contractors themselves were asked to establish a price low enough to be appealing, while at the same time high enough to assure a fair return for the energy expended by them. After the establishment of this special price, order books were prepared by the league and distributed to members. This was done for the purpose of encouraging a strict adherance to the price agreed upon and likewise to facilitate the work of the staff in compiling the results upon conclusion of the campaign.

At the request of the contractors a purchaser was permitted to have single-pole switches installed at the same price that was quoted for the installation of convenience outlets. However, very few switch installations were reported.

With the exception of the art work, all advertising copy was prepared by the staff of the Electrical League. Each illustration depicted two of the major rooms in a home, one of them inadequately wired, and the other properly wired for convenient electric service. In order to encourage customers not

*NOT necessarily a panacea for all the ills of the electrical contracting business but certainly a stimulative market development plan which compares with merchandising done by successful businesses. The danger lies in setting a fixed price for work which may vary greatly in actual installation cost.*

only to purchase outlet installations, but likewise to visit the contractor at his place of business, 400 copies of the Copper and Brass Research Association's booklet, "Wiring and Rewiring," were distributed among the contractors. Each advertisement referred to this



Special Convenience Outlet Order No 180

Date ..... 192 ..

CUSTOMER'S NAME .....

ADDRESS .....

PHONE ..... WHEN WANTED .....

Installation of 3 Duplex Convenience Outlets, (or ..... Duplex Convenience Outlets and ..... Single Pole Switches), at special introductory price ..... $15.85

Installation of ..... additional outlets (..... C. O's. and ..... Switches), at special price of $4.95 each .....

Remarks:

Total ..... $

Work authorized by .....

(THIS COPY TO BE GIVEN TO CUSTOMER)

In accordance with the law, and upon completion of this installation, the work will be inspected by a City Electrical Inspector who will give you an inspection certificate. This is done without cost to you and is provided for your protection. If no inspection is made within five days of completion of the work, notify the City Electrician at Main 1136-F.

ELECTRICAL CONTRACTOR .....

ADDRESS ..... PHONE .....

Order form made out in triplicate used in the campaign.

booklet and suggested that it could be obtained without charge on application.

Although the entire lot was not given out during the period of the campaign, the contractors are still making good use of them by passing them out to customers in their stores.

The total cost of this activity amounted to $2,466.82, of which amount $2,268 was spent for display space in the newspapers. The remainder covered the cost of art work, special order books, window cards, zinc cuts, form letters, matrices, etc. By previous agreement the Public Service Company of Colorado, Denver, assumed $2,000 of the advertising expense. Other costs were paid by the league.

#### Statewide in Effect

Although this activity had for its purpose the building up of residence wiring business in Denver, it was realized that the newspaper advertising would likewise have its effect in other cities throughout the state. Accordingly it was suggested that the central station managers in the State of Colorado conduct wiring campaigns during November and thus capitalize on the Denver advertising. This was done in a number of instances.

Those who are familiar with promotional development campaigns know how extremely hard it is to compile accurate data relative to results. It will be interesting to learn that all members of the local electrical workers' union were employed during the entire month of November and, as has been stated, November is usually a very quiet month insofar as home building is concerned.

From the contractors' standpoint it may be said that they were highly pleased with results. A number of members requested that the activity be extended another two weeks in order that they might accommodate their customers at the special contract price. This was not done, however, because it was thought that to do so might weaken succeeding campaigns.

The following letter from the secretary of the Denver Electrical Contractors' Association will serve to indicate how Denver contractors feel about the success of the local activity:

Mr. Geo. Bakewell,
Manager, Electrical League of Colorado,
Denver, Colorado.

At a recent meeting of the Denver Electrical Contractors Association it was unanimously agreed by all those present that a vote of thanks should be extended to the Public Service Company, the league office

The CONVENIENT WAY
The WRONG WAY
What's wrong with THIS picture?
The picture tells the story. It is no longer necessary to perform gymnastics in order to connect electric appliances. CONVENIENCE OUTLETS in the wall or floor are designed to eliminate all of this.
Denver's first CONVENIENCE OUTLET sale is now on.
$15.85 for 3 Duplex Convenience Outlets, Installed.
Additional Outlets, $4.95 each
(Single pole switches may be substituted at this price)
Call one of the following contractors who will make the installation and guarantee its official inspection by the City Electrician. ENJOY electric service and the convenient use of your appliances.
GET IN TOUCH WITH ONE OF THEM TODAY
Beyer, Frank W., 3024 S. Bdwy. Englewood 773.
Bolibaugh Elec. Co., 232 E. Gilpin. South 1605.
Byrne Elec. Co., 963 Madison York 1414.
Denver Elec. Co., 15th & Cleveland Pl. M 1886.
Edwards Elec. Co., 306 15th St. Main 4498.
J. Fischer Elec. Co., 213 15th St. Main 2188.
Graveline Elec. Co., 919 E. Alameda. So. 0722.
W. A. J. Guscott, 1726 Champa. Main 1800.
Hendrick Elec. Co., 89 Broadway. South 1740.
Kaffer-Chapman Elec. Co., 1516 Arap. Key. 3469.
James Lewis, 477 S. Humboldt. Sunset 1443-J.
Milzer Elec. Co., 1956 W. 14th Ave. Main 1217.
Queen City Elec. Co., 1159 Calif. Champa 1293.
H. G. Reid, 1714 Broadway. Main 2303.
Scott Bros. Elec. Co., 531 15th St. Main 1548.
Chas. M. Shannon & Co., 729 15th St. M. 2091.
Silver State Elec. Co., 222 15th St. Main 1598.
Sturgeon Elec. Co., 1534 Court Pl. Ch. 1830.
Geo. B. West, 304 Kitzi. South 1647.
West Denver Elec. Co., 828 Santa Fe Dr. S. 310.
Williams & Rose El. Co., 435 15th St. M. 1538.
(Call for your copy of the book, "Wiring and Rewiring." It's FREE.)
The Electrical Contractors and The Public Service Company of Colorado

One of the eight quarter-page advertisements run during the campaign, carrying contractors' names.

The WRONG WAY
The CONVENIENT WAY
Is your Living Room a Network of unsightly Extension Cords?
Let us install a few Convenience Outlets to remedy this condition. For a limited time only our Special Price is
$15.85 for 3 Duplex Convenience Outlets, Installed.
Additional Outlets, $4.95 Each
(Single Pole Switches may be substituted at this price)
Let's Talk It Over!

Window card displayed by contractors co-operating in the convenience outlet sale.

staff and all those who so generously contributed to the success of the Denver convenience outlet campaign.

The campaign, in our candid opinion, has been a success and of great help to the electrical industry and an educational benefit to the public.

The wonderful spirit of co-operation as fully shown by the Public Service Company is highly commendable and it is sincerely hoped that a continuation of this fine spirit of co-operation may forever follow.

At the conclusion of this campaign we are prompted to declare ourselves much in favor of encouraging future campaigns in a like manner.

With a desire to co-operate at all times, we are most

Sincerely yours,
THE DENVER ELECTRICAL CONT. ASSOCIATION.
E. C. HEADRICK, Secy.

### Improved Trade Relations

It will be seen that from the standpoint of improved trade relations the convenience outlet campaign is looked upon favorably by local central station officials. The Public Service Company did not solicit any of the wiring business in accordance with its established practice.

Jobbers in Denver report a very satisfactory increased business in wiring materials. Hardware and specialty managers reluctantly admit that there was a very noticeable increased demand for outlet boxes, plates and armored cable during November and the early part of December. While the electrical industry of Denver deplores the tendency on the part of the home owner to try his hand as an electrician, it is hard pressed to find a satisfactory solution to the problem. Some consolation is had in the realization that the newspaper advertising presented a real selling message and convinced the home owner that he could well use additional electric outlets.

### Compiling Results Difficult

In order that the results of this activity might be presented in more concrete form, 73 questionnaires were mailed out to Denver electrical contractors. Of this number, 36 were actually returned. Twelve of those who returned the questionnaires either refused to fill them out properly or else advised that they did no repair work and for this reason did not benefit by the campaign.

The remaining 24 contractors reported the following business brought about as a direct result of the convenience outlet campaign:

Total number of duplex convenience outlets installed, 672.

Total number miscellaneous outlets installed (including brackets, ceiling and switches), 254.

Total number of outlet boxes and plates sold over the counter, 721.

Total value of wiring supplies sold over counter, $1,448.30.

Total number of fixtures sold to wiring customers, 163.

Value of fixtures, $1,279.

Total value of appliances sold to customers as a direct result of the convenience outlet activity, $2,628.

According to actual report, then, 1,647 additional outlets were put into service because of the campaign. Nine hundred and twenty-six of these were installed by contractors which, at $5 each (less than the average contract price) means that these 24 contractors enjoyed $4,630 in additional wiring business.

Total counter sales reported as a result of the activity amounted to $5,272.30. Adding to this the $4,630 in wiring business it is seen that the gross volume of business brought about through the league's convenience outlet campaign came to a little less than $10,000 according to the figures actually reported.

It may be estimated conservatively that the remaining 37 contractors who failed to send in their reports fared at least half as well as those who returned the questionnaires. On this basis, and not making any estimate as to the counter sales of the hardware and specialty stores, nor as to the volume of business done outside the city, league officials feel justified in estimating that, on an investment of $2,446.82, the electrical industry did a gross volume of business closely approximating $15,000 during the period of the campaign.

Local contractors are still reporting an increased demand for additional outlets in residences and it stands to reason that because of this newspaper advertising the purchaser of a new home will question the builder regarding the adequacy of the electric wiring prior to closing the contract.

This activity is so far-reaching in its effect that the Colorado league is seriously considering a repetition of the campaign during the spring of the present year.

# Never Too Old For Complete Rewiring

## Fifty Years Old and Good for a Century More, a House in the Sutter Buttes Is Modernized

TO THE contractor who is dubious as to the possibilities for rewiring old homes G. J. Elbert, electrical contractor of Marysville, has only one comment to make:

"The older they are the harder they fall."

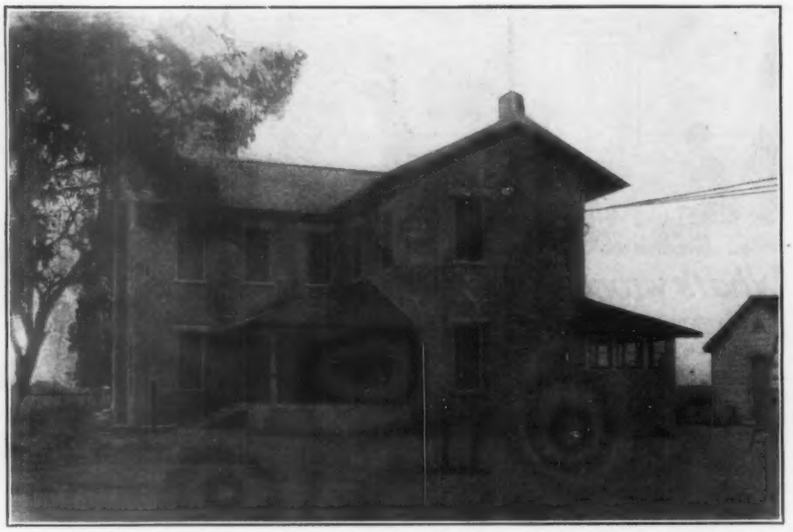
Built out of the rock from the Sutter Buttes at whose feet it stands, the house of C. J. DeWitt was erected fifty or sixty years ago, for instance. It was the rewiring and electrification of that home which caused Mr. Elbert to make his statement.

The stone house now in the possession of Mr. DeWitt was acquired by him a few years ago. Last year he determined to renovate it and bring it completely up to date. Its 3-ft.-thick stone walls conveivably might stand for another half century and give service even beyond that, he decided, but to live in it without modern conveniences such as those which electricity provides certainly is no longer necessary, no matter how old a house may be. Accordingly, when the home was renovated and additions made to it in the way of verandas, baths and a new roof, the rewiring was given to Mr. Elbert to do.

Mr. Elbert demonstrated to Mr. DeWitt the value of making the electrical installation as up-to-date as the other work he was having done to the house in order adequately to prepare the home for the greatest possible usefulness during its next half-century.

Beginning with the kitchen the old wood-and-coal range was supplanted by an electric range. A kitchen lighting unit took the place of the drop cord and convenience outlets at handy places now make possible the use of a number of kitchen appliances.

New fixtures were installed in all rooms of the house with a number of two, three and four-way switches for the control of the lighting. Convenience outlets were provided liberally in order that the table and floor lamps manufactured by the boys of the family in their high school shop classes, could be put into use by the proud father.



Yard light mounted on a 50-year-old wall of solid stone, three feet thick.

A large back porch houses the electric laundry equipment and the switchboard serving the house.

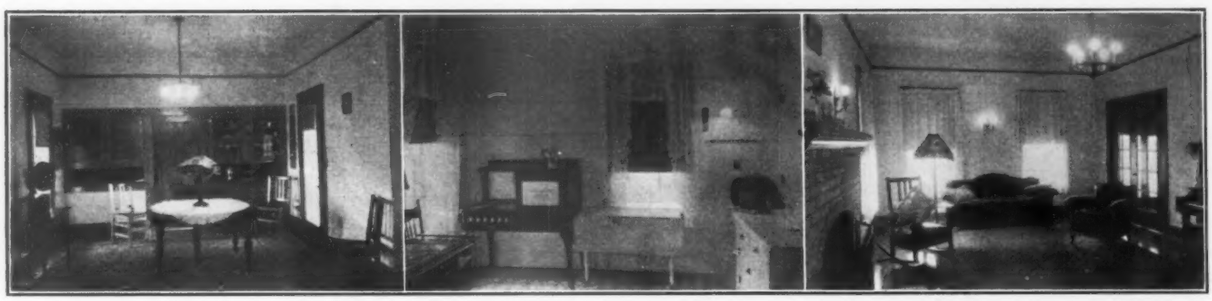
A large back porch houses the switchboard and constitutes the laundry, equipped with an electric washing machine.

To light up the yard and surroundings of the building at night a 500-watt lamp with a reflector is mounted just below the roof of the building. Three-way switches in the upstairs hallway or in the kitchen give control of this light and make it possible to switch on the light from either floor in case of noise at night.

Water srevice is provided to all parts of the house by an electrically operated water pressure system and Mr. DeWitt says that one by one the various electrical conveniences now available will also find their way into his home. He is determined to make it permanently utilitarian and convenient, as permanent as its 3-ft. stone walls at least.

---

**Rat That Gnawed the Wire**—When an enterprising young rat started out to make a meal of the insulation on an electric wire in C. O. Arnold's jewelry store in Pasadena, recently, he neglected to insulate himself from ground; as a consequence Mr. Rat is no more. Fred Vore, city electrician of Pasadena, who was called in when the unfortunate rodent's plight was discovered, stated that in his long years of service this is but the second instance he knows of in which a rat actually gnawed the insulation from an electric wire.



Remodeled, a fifty-year old house in Sutter County, Calif., presents a very modern aspect. At left the dining room with radio, table lamp and other electrical appliances. Center, the 3-ft.-thick stone walls of the kitchen now house an electric range to replace the old coal stove. A kitchen lighting unit is installed and outlets for electrical conveniences are numerous. Right, new living room which electricity helped to make modern.

# Layout Builds Up the Wiring Job

**By Showing Interest and Suggesting Improvements for the Home's Electrical System the Contractor Does His Customer a Service Which Reflects in His Profits**

INSTEAD of merely accepting a wiring job upon a low bid and then hoping to be able to build it up after the work is started on what contractors are pleased to call "extras," Paul Needham, Electragist of Beverly Hills, finds that to devote a little time to the job before a bid is entered is a profitable investment.

The amount of interest exhibited in the job itself and the constructive suggestions he is able to make to the builder or owner, he has found, often determine the placing of the job in his hands. The architect or owner, treated to the unique experience of finding an electrical contractor with constructive suggestions for the improvement of the home and its convenience is moved often to favor such a contractor in the face of competitors' lower bids, it has been found.

The method used by Paul Needham is a simple though effective one. The usual procedures are followed to get in touch with building projects in his community. Obtaining a blueprint of the proposed building, be it of a home or any other type of structure, Mr. Needham takes it into his shop. Upon a glass-surfaced drawing table which he made himself from pipe fittings and lumber, and which will be described later, he places the blueprint. Over it is laid a sheet of tracing paper upon which he proceeds to lay out the wiring plan.

This rough tracing is then discussed with the architect or the builder prior to the letting of the job. If the job is not given to him Mr. Needham keeps the tracing in his own possession. It is his property and the blueprint without his layout goes back to the architect without the benefit of the engineering which he has done for the good of the job.

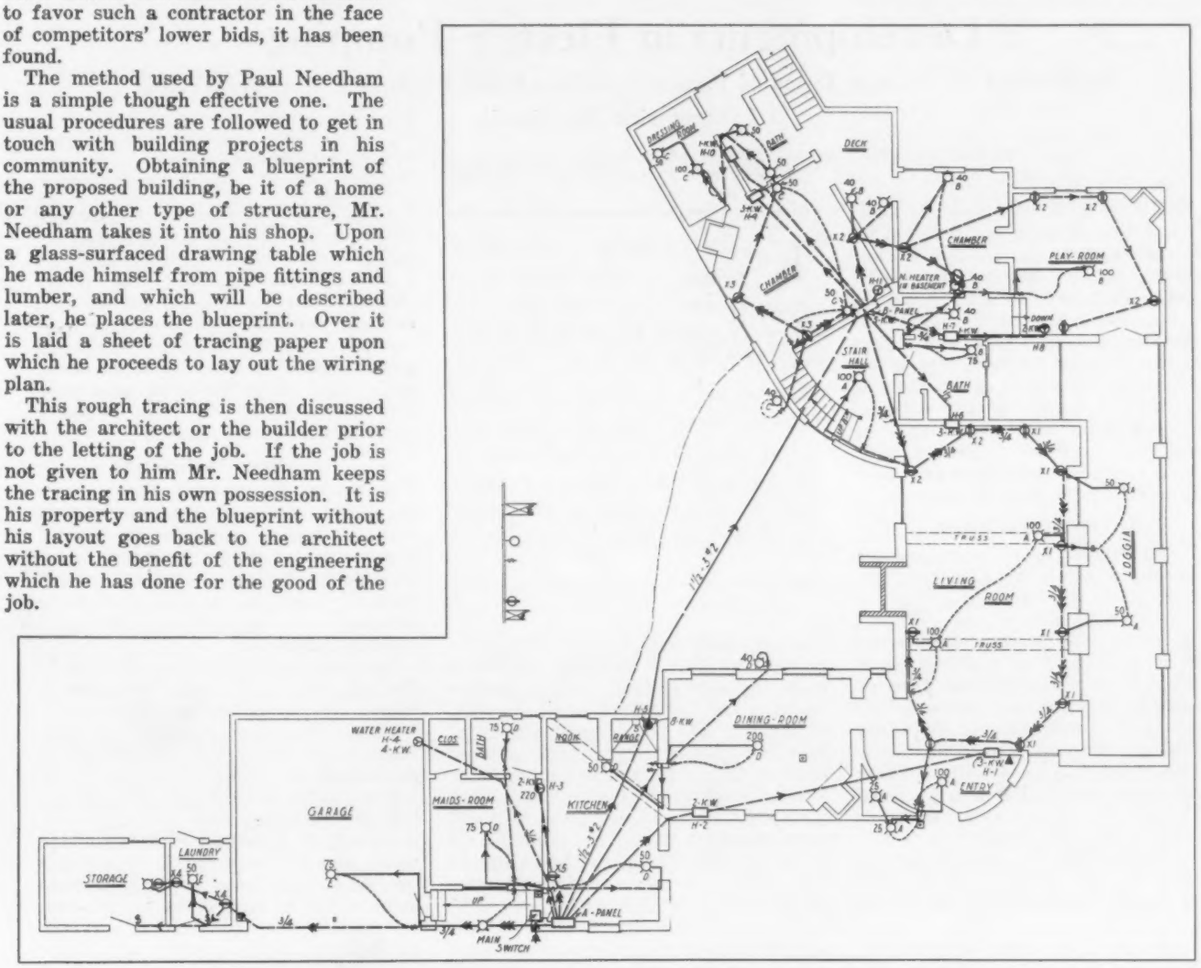
Homemade tracing board upon which Paul Needham makes a tracing from the blueprint submitted for bids and on which he makes a suggested layout for the job.

If the job is given to him he inks in the wiring layout and adds to the tracing the outline of the building or floor plan and has blueprints made from it from which his men may construct the job itself.

### A Notable Example

One of the best examples of the effectiveness of this type of layout is in a recent job on the home of Joseph Graham of Beverly Hills.

In this case the owner was also the




Layout of wiring (in heavy lines) as drawn by Paul Needham before submitting a bid. After getting the job the outline of the floor plan was drawn in.

builder of the home. The guaranteed price given on the preliminary specification was $769.22. As a result of constructive suggestions this job was billed finally for $2,398.34 of which $723 was for appliances.

A master control for the lighting, or "burglar lights," was installed throughout the house. By means of the master switch one light in each room in the house could be lighted from the master bedroom. The selling price on the burglar lighting system alone was $48, a price which the owner was glad to pay for the safety it provided.

A difficult problem in grounding was encountered because of the extensiveness of the house, so the plumber was asked to run a ½-in. water pipe close to the switch cabinet. The knock-outs on opposite sides of the box were taken out and the water pipe was run through it. A grounding conduit was then carried to the side of the box allowing an accessible point for the bonding of both telephone and service lines.

The job as completed in labor alone ran more than the original bid for the entire job. This demonstrates the amount of work which was done after the builder was convinced of the capability of the contractor to make the installation.

**Permanent Record**

In this case Paul Needham made a layout as shown herewith which sold the job. The layout was made in pencil on the tracing paper, as previously described, and then when the job was awarded him he traced it out in ink for the blueprint. Such blueprints as necessary were pasted to beaverboard and changes in the plan were noted by the workmen on the job directly on the blueprint. Thus mounted a plueprint could be hung up on a nail on the job and used to guide the operations of the workmen. After the job was completed these changes were noted on the original tracing so that Mr. Needham will have available to the owner of that home at any future time an accurate diagram of the wiring of his home should any changes be required.

The illuminated drawing table, briefly described, consists of a redwood frame in which is set a plate glass. For best results the glass should be ground on one side although Mr. Needham has painted the underside of an ordinary plate glass and achieved very good results. The frame rests above a trough in which are placed two or three frosted lamps, the light from which is to pass through the ground glass and the blueprint to the tracing paper.

The trough and frame are then mounted on a rack made of pipe fittings and pipe. Close examination of the accompanying photograph will give a general idea of the construction.

Doing the work himself, the cost of the drawing board in materials alone was $9.75, according to Mr. Needham.

"Entirely aside from the convenience of having a good working diagram of a job, no small item in itself," says Mr. Needham, "to develop a diagram of this kind places in your hands many good sales advantages. In the first place it gives the electrical contractor a better mental picture of the job which enables him to make constructive suggestions and improvements having a direct bearing on selling the job. Of course, this idea is not infallible and of itself will not sell the job every time, but it is a big help and on those jobs which it does help to sell it also makes easier a subsequent building up and gives good reasons for getting a fair price for the work on the basis of a quality job."

# Developments in Electric Pumping

## Application of Various Types of Pumps Considered and Work of University Testing Laboratories Explained

By BLAKE R. VANLEER, M.E., Assistant Professor, Mechanical Engineering, in Charge of the Hydraulic Laboratory, University of California.

WHEN recent developments in a certain line of work are referred to, there always arises the question of what is meant by the use of the word "recent." Just how far back should we go? Man has inhabited the earth several hundred thousand years and during all of that time he has been struggling to subdue the elements of nature and make himself master of his environment; yet, practically all of the advances in the use of machinery have occurred in the last 200 years and most of them within the last 50 years.

**The Centrifugal Pump**

It is during the last 30 years that the type of pump has been extensively developed which we have come to look upon as "the electric pump." This is not a correct title because the electric motor is used today as a prime mover for almost every conceivable type of pumping device. However, pumps which employ the centrifugal principle are particularly adapted to electric induction motor drive. The centrifugal pump was first invented by Papin in 1689 and its theory was discussed as early as 1754, but it was in no way put to any extensive practical use until it was introduced into the United States in 1818 where it was first known as the Boston pump and later as the McCarty pump.

Its use then was very limited, first because there was at that time no suitable prime mover for such a pump and also because it was thought only applicable to low lifts. However, coincident with the development of the electric motor, about the beginning of the present century the centrifugal pump came into its own, and today is perhaps more extensively used than any other type. Fully 75 per cent of all pumps being installed today are of the centrifugal type and about 60 per cent of all pumps in use are electric drive. In California the percentage of centrifugal pumps electrically driven is even higher.

*KNOWLEDGE of the right pump for the right purpose is the secret of satisfactory electric pumping service—which will mean more pump business. A comprehensive, simply stated review of pumps, their possibilities and limitations, will be found in this article by an impartial and well qualified authority.*

There is practically no phase of engineering which does not sooner or later come to rely upon a pump and most of these pumps are driven by electric motors. The four great outstanding fields in which pumps are employed are irrigation, water works, industrial works (such as factories, etc.), and power plants. The electrically driven centrifugal pump is supreme in each of the fields with the exception of that of power plants. In this respect, however, centrifugal pumps are being used more and more, although they are in many cases steam turbine driven.

**Irrigation Applications**

In California the 1920 census shows there are about 4,219,000 acres of land being irrigated and the Bureau of Reclamation claims 12,000,000 acres suitable for irrigation. In other words there is three times as much land to be irrigated as is already under the magic spell of irrigation.

Most of the land to be irrigated in the future will be irrigated with pumped water, for the following reasons:

**First,** the gravity water systems feasible in California are rapidly being exhausted, the few remaining requiring a great outlay of capital and the building of huge reservoirs.

**Second,** the farmer who uses pumped water can not only get it at a much smaller outlay of capital but he is more independent, he can get his water when he wants it, where he wants it, and that is vitally important.

**Third,** the farmer who uses pumped water is almost entirely free of drain-

age problems. In many parts of the state water is pumped as the cheapest and most effective way of securing proper drainage.

Fully 90 per cent of the pumps to be installed for future irrigation will be electrically driven. The prospects for the future of the electric industries were never so bright.

Another way of seeing the enormous growth in irrigation pumping is to study the United States census on pumped wells. The census for 1910 for California showed 10,724 pumped wells; in 1920 this number had grown to 25,401, an increase of 131 per cent. Mr. Robert Schurman, vice-president of the Byron Jackson Pump Manufacturing Company, estimates that there are in California today (1927) over 80,000 pumps, and that 75 per cent of these are electrically driven. The census also shows for California in 1910 128,143 hp. installed for well pumping and in 1920 386,200 hp., which is an increase of 201 per cent. The total installed capacity in 1920 was 16,770,000 gal. per min. Of all the pumps installed for pumping from wells the sizes vary approximately as follows:

Under 5 hp., 35 per cent.
7.5 to 10 hp., 30 per cent.
15 to 30 hp., 25 per cent.
40 to 50 hp., 7 per cent.
75 to 100 hp., 3 per cent

### Recent Developments

In engineering it is difficult to say, "on this date the standard practice changed and became so and so." As rapidly as things are moving they do not change in that manner. A change is made here, another improvement there, and so on. Each year pumps are slightly improved as conditions warrant.

Following are some of the outstanding changes in pumping in the last ten years.

### Higher Speed

**First,** there has been a steady increase in the speed at which pumps are operated. This has always been sought after because it permitted the use of less material in the pump.

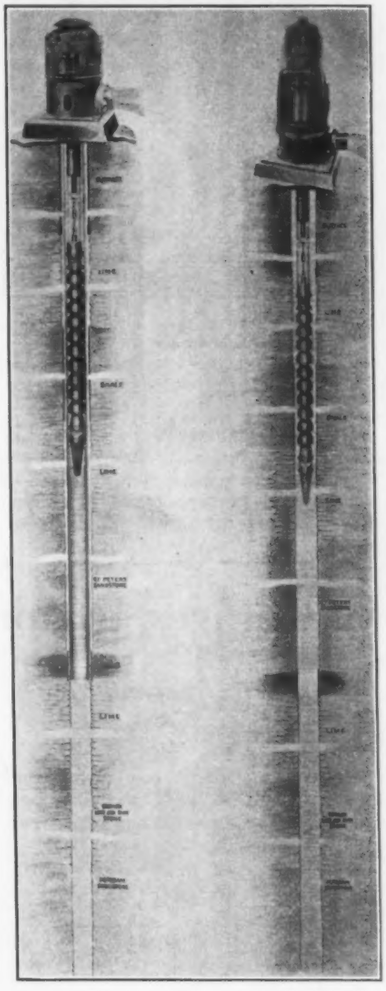
**The quantity a centrifugal pump will deliver varies approximately as the speed, the head it will deliver varies as the square of the speed, and the hp. as the cube of the speed.**

These laws are known as the affinity laws of centrifugal pumps. Hence, the faster a pump could run the fewer stages it would require and hence the less it would cost. This is likewise true of the motor. The higher the speed of an induction motor the less it costs because it has fewer poles. The trouble always has been with the bearings of the pump. This problem to some extent has been eliminated by the very clever use of two ball bearings, one on top of the other. By this procedure the relative speed between the balls of the bearings is much reduced, and it is not an uncommon thing to find many pumps of the deep well turbine type operating at 3,600 r.p.m. and manufacturers are experimenting with speeds near 5,000 r.p.m.

### The Deep Well Turbine Pump

**Second,** the development of the deep well turbine pump in the West has been most spectacular during the last ten years. It is estimated that there are now over 12,500 deep well turbine pumps in California alone. A deep well turbine pump is a vertical centrifugal pump whose runner is in, at or near the water surface inside of the well casing and whose prime mover is located at the ground surface.

In this type of pump the motor and pump turbine or runner may be and



(1) (2)
Deep-well turbine pump cross sections showing typical well inner column and small well required for great depth: (1) has a built-in head; (2) has direct-connected motor.

frequently are separated by as much as 200 ft. of vertical shafting. It seems incredible but these deep well turbine pumps have been used successfully to pump water from a well 440 ft. deep and have been built in twenty stages.

They deliver large quantities of water, fairly efficiently, and very materially decrease the first cost of the installation. Their chief disadvantage is the fact that the pumper's eternal enemy, sand, after a few years will get into the lower bearings and necessitate the removal of the pump for repairs. This, however, very likely would happen with any type of pump where sand is a continuous by-product. In a case of this kind where dependability is essential the only solution is the use of the air lift.

A great deal of progress is being made in the application of the air lift and in no far distant future the cost of pumping with an air lift will be very materially reduced. Air lift efficiencies are now 30 to 50 per cent higher than they were ten years ago. However, they are still too low to be a very serious competitor of the centrifugal pump where large quantities of water are to be pumped.

Deep well turbine pumps differ in many ways in construction details. The more modern ones have built-in heads, that is, the motor frame is part of the pump and the last piece of pump shafting is also the shaft for the motor. Only the stator and rotor winding are made by the electric manufacturing companies, the rest is made and assembled by the pump manufacturing companies.

The upper bearing supports the entire load and is where it can be oiled and inspected at any time. These pumps are made with both an open and closed inner column. Extensive life and service seem to favor the closed column. The lower bearings of course cannot be inspected after the pump is placed in the well so they are packed in waterproof grease. The runner, shafting, etc., are made of different materials; some cold rolled steel which are not so good, some of bronze which are little better and some of stainless steel which are the best. Likewise there are different systems of lubrication, all of which have their disadvantages.

### The Vertical Centrifugal Pump

Water is found in a great many areas in California in depths of from 15 to 45 ft., hence vertical centrifugal pumps in a shallow pit can be employed in much the same manner as a deep well turbine pump. This gains accessibility and lower costs but has the serious disadvantage that it is not suitable for fluctuating water levels as the water may drop below the practical or even the theoretical suction lift possible. This would mean the removal of the pump and most likely the purchase of an entirely new pumping outfit.

A recent test of a newly designed vertical centrifugal pump showed that it gave a remarkable high efficiency of 85 per cent. This particular pump was equipped with a 20-hp. motor which could be thrown on the line without either a starter or compensator. This also marks one of the sensational and remarkable improvements in electric motors used for pumps. It makes possible the reduction in the cost of installation.

### Tests Important

Another recent development in the pumping industry is the desire on the part of manufacturers to know just exactly what a pump will do before it is installed, and frequently the purchaser desires to know whether the

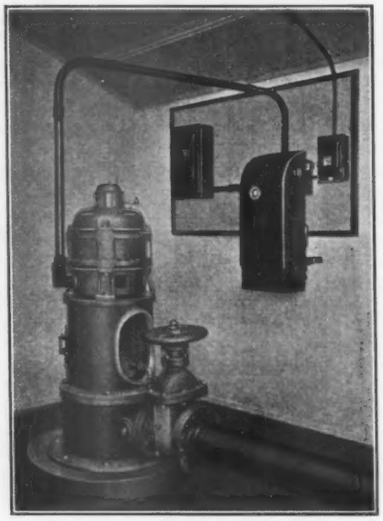
pump comes up to the manufacturer's guarantee when installed in the field.

This knowledge is furnished by careful tests conducted at the plant before the pump is shipped and in the field after it is installed. A manufacturer who does not give his pumps a thorough test before they are shipped has not the kind of firm with which to deal.

This attitude has stimulated the development of many hydraulic laboratories. In California the largest and best equipped laboratory is at the University of California. It is second to none in the excellence of its instruction and in research. It has several bits of work which have won prizes and recognition from the American Society of Mechanical Engineers.

It is not the policy of the University of California to conduct commercial tests which can be conducted elsewhere and when a test is conducted it does not permit the use of its name or guarantee the results. The persons desiring the test must pay all expenses of the test. Such tests are discouraged because the university under no circumstances will compete with men who make their living by conducting similar commercial tests. However, for high grade work, that is, tests which have never been made before and which cannot be made satisfactorily elsewhere, the hydraulic laboratory at the University of California stands ready to serve the people of the state at all times.

In the hydraulic laboratory of the University of California pumps can be tested with capacities up to 4,000 gal. per min., and almost any head. The quantity is measured by means of cali-



A modern deep-well turbine pump showing pump head, electric motor, starter and general simplicity of installation. Note small floor space required.

brated weirs, that is, weirs which have been checked against volumetric measurements. The head is measured by means of a pressure gage, level, mercury manometer, or all three.

If the pump is independent of the motor and under 50 hp. it can be tested by means of the Sprague electric dynamometer. This is an excellent piece of apparatus which has been developed within the last ten years. It is in essence a d.c. generator with both field and armature free to rotate. The reaction between the field and armature is a measure of the power being transmitted or absorbed. By means of a series of levers it is possible to measure this reaction, which gives the power transmitted when multiplied by the lever arm and the r.p.m. The machine is independent of the efficiency and hence of the losses inherent in it.

Now what of the future? It would be a desirable thing if, instead of having a long shaft with its accompanying troubles, the motor could be put down in the well with the pump. This is on the verge of realization. The difficulties to be overcome are electrical. The electrical engineer and motor designer must make the next step forward in electric pumping. The requirements call for a long motor, not larger than 18 in. in diameter; one whose iron losses and heat can be dissipated in the water and one whose insulation will not break down easily when under high water pressure.

The application of electricity to the operation of pumps in California is in its infancy. Those who have chosen the field of electrical engineering and its allied industries as the field for future activities have chosen well.

# Electric Ventilation for Garages, Factories and Spray Rooms

By J. R. Wilson*, Quality Electric Works, Los Angeles.

*Electrical Estimating Series—XXXIII*

*IN PREVIOUS articles of this series the methods of installation of ventilating fans for various types of buildings were described. (See* ELECTRICAL WEST *Dec. 1, 1927, p. 348; Jan. 1, 1928, p. 36; and Feb. 1, 1928, p. 106.) Special applications are given further consideration here.*

### Garages

FACTORIES, garages, and other buildings of that type are built usually with a single roof, as shown in Fig. 16. This type of building offers ideal conditions for the use of power roof ventilators. In buildings of large floor area, more than one ventilating unit

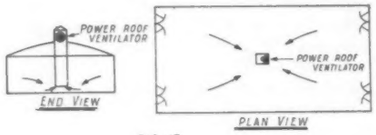



FIG-17

should be used. These should be so placed as to give equal distribution throughout the entire area. In some cases only certain parts of the area need ventilating. Where this condition maintains, individual roof ventilators should be placed over these spaces, regardless of equal spacing relative to the total floor area.

In most of the modern garages the repair shop is placed in the rear por-

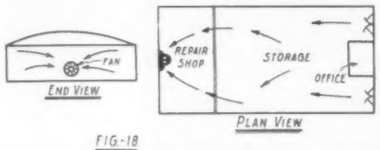
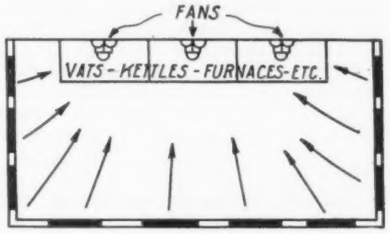



FIG-18

tion of the building. As the larger part of the engine testing is done in the repair shop there is present usually a considerable qauntity of carbon monoxide gas. This gas is very poisonous, and being heavier than air, settles to the floor. Where floor pits are employed, to give access to the under side of the cars, the presence of this gas creates a condition dangerous to both life and health. By installing a vertical duct from the roof ventilator unit to within almost two feet of the floor, this gas can be exhausted quickly. (See Fig. 17.)

In Fig. 18 is shown the correct method of installing a propeller fan in the rear wall of a garage repair shop to exhaust the monoxide gas. This type of installation is sometimes necessary where living rooms or offices are built above a garage or repair shop. As shown in the drawing, the fan should be installed close to the floor line, with a wire guard placed on




PLAN VIEW
FIG.-19

the inside and automatic louvers, or shutters, on the outside. It will be noted that the air circulation is from the front to the back, as in the restaurant system previously described herein. The only difference is that in this case the fan is placed near the floor. As previously stated, the windowns and doors near the fan should

* All rights reserved by the author.

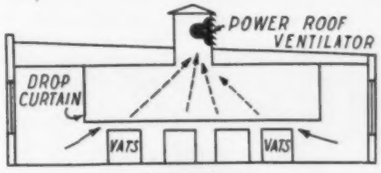
be kept closed to prevent short circuiting of the air. This fact should not be forgotten in any system making use of propeller fans. In winter time conservation of heat is very important in work shops. By placing the fans close to the floor line the cold air is exhausted, thus effectively helping in heat conservation.

**Removing Dust, Fumes, Etc.**

In almost every foundry, factory, creamery, feather works, dry cleaning establishment, upholstering works, mattress factory and pickle works, problems are encountered having to do with the removal of dust, gases, fumes, etc. The majority of these problems can be solved by the right placement of ventilating fans of proper type and

END VIEW
FIG.-20

size. Fundamentally, most of these cases are similar to the ventilating of restaurant kitchens—and will yield to similar treatment. Where conditions are such as not to require a "duct and blower" system, a propeller fan should be placed as near as possible to the point of difficulty. In this way all of the objectionable matter will be exhausted directly to the outside atmosphere. An inspection of Fig. 19 will show how the objectionable mat-

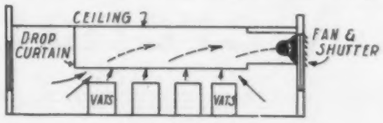



SIDE VIEW
FIG.-21

ter is removed from its point of origin and fresh air is supplied to the workers.

In cases where the vats, kettles, furnaces, etc., are located in the center of the working space of a one-story building, or on the top floor, again recourse can be had to the power roof ventilator unit. This should be placed directly over the source of the objectionable matter and evenly spaced, as before stated. Reference should be made to Fig. 14, 15, 16, 21 and 22 to make this idea clear. This method of placement assures the workers an adequate supply of fresh air at all times.

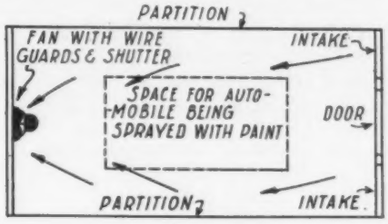
The monitor type of building (Fig. 20) is ideal for the removal of smoke, fumes, etc. Where this type of construction is employed the building is usually of considerable height, or the monitor section, at least, is carried to quite a height above the rest of the building. This has a tendency to create a condition where considerable natural draft is present. By placing the propeller fans in the monitor section and equip-




SIDE VIEW
FIG. 22

ping them with automatic shutters to prevent the entrance of wind and rain a ventilating system of high efficiency can be attained.

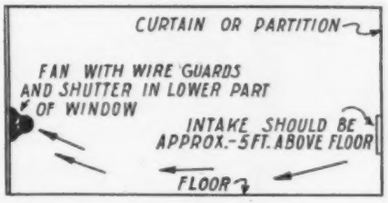
In Fig. 21 and 22 are shown two very effective methods of ventilating a room where steam kettles, ovens, etc., are used. In the first figure the kettles, etc., are located in the center of the room on the top floor of the




PLAN VIEW
FIG. 23

building. The system used comprises a roof ventilator unit installed in the center of the space to be served, with a short duct connection through the attic space above the ceiling. Pendant from the ceiling is a "drop curtain" which encloses the location of the kettles, vats, etc. This curtain hems in the vapors and also serves to guide them toward the roof ventilator.

These curtains may be made of heavy canvas, wood or wallboard. They may also be made of light metal where semi-corrosive vapors are present.

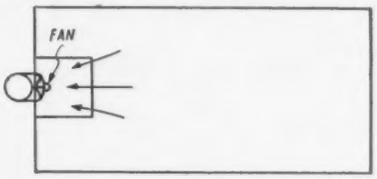

CURTAIN OR PARTITION
FAN WITH WIRE GUARDS AND SHUTTER IN LOWER PART OF WINDOW
INTAKE SHOULD BE APPROX.-5FT. ABOVE FLOOR
FLOOR

SIDE VIEW
FIG. 24

Where the steam or vapor producing apparatus is located on the first floor of a building, where access cannot be had to the roof, the method shown in Fig. 22 can be employed. In this case the fan is installed in the side of the wall, and a short duct used to make connection with the curtained-off space.

**Spray Booths and Rooms**

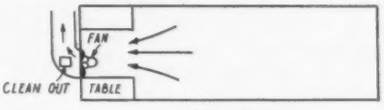
The ventilation of small spray booths requires an air change every one to two minutes. The foul air must travel away from the operator as fresh air travels towards him. If the room is of such size that more than one automobile can be painted at the same time, a fan should be installed in front of each car. This creates better air distribution. The fan should be placed low so that the fumes are drawn away from the operator and below the breathing level. A sliding sash may be provided and the fan installed just inside of it. This sash of course must be opened when the fan is in use. Wire guards should be provided on the room side of the fan.




PLAN VIEW
FIG.-25

In the case of spray rooms in which automobiles are painted it is not necessary to provide as rapid a change of air as that specified for booths. The larger volume of air available to the operator provides more breathing space and a lesser number of changes therefore will be required. Fig. 23 and 24 show proper arrangement of a fan in a room designed for the painting of automobiles.

The method used when installing a fan in a spray booth is shown in Fig. 25 and 26. Where the articles to be sprayed are comparatively small, as is the case where small booths are used, the operator usually stands in one position and the articles are placed on benches of proper height. In such a case a propeller fan of proper size is placed in the end of the booth and the articles to be sprayed are placed on the bench. This bench should be of such




SIDE VIEW
FIG.-26

height as to allow the fumes and vapors to be drawn off rapidly by the fan. (See Fig. 26.) To insure satisfactory results the fan must be of adequate size. A booth 3 ft. x 4 ft. x 6 ft. will require a 16-in. fan. Booths of larger size of course will require fans of correspondingly larger size. Never use a fan smaller than 16 in.

Where larger articles are placed on the floor and sprayed (the operator working around them), the method recommended in Fig. 23 and 24 should be used. The fan should be placed as near the floor as possible, with the air intake openings at about 6 ft. from the floor. Where the fumes or vapors are of an inflammable nature, a fan large enough to give a very rapid air change should be employed. Ten times per minute is proper for a booth 10 ft. x 10 ft. with 8-ft. ceiling. Satisfactory results are based upon proper rate of air movement.

*(To be continued.)*

# Better Merchandising

## "See as You Enter" Refrigeration in El Paso

### Street-car Passengers in Texas Town See Electric Refrigeration in Actual Operation as They Board Car to Ride Down-town

By W. G. THOMPSON, El Paso Electric Company

ONE OF the methods used by the El Paso Electric Company to advertise electric refrigerators seems to disprove the generally accepted theory that "there is nothing new under the sun." The El Paso Electric Company operates the light and power business and the street railway system in El Paso, Texas, and the stunt was made possible through the co-operation of the transportation division.

In order to stimulate fall sales of electric refrigerators, one of the smaller and most popular models was installed on one of the company's street cars. The car used for this purpose was a De Luxe Birney of the latest type, a newly purchased car. The refrigerator was placed at the front end of the car, just behind the operator, where all boarding passengers were bound to be attracted by the unusual display. The handsome carbinet added to the finish of the car interior.

This installation was made by replacing the standard alternating current motor in the refrigerator with a direct-current 110-volt motor, and 220 ohms resistance was placed in series with the motor in order to operate on the 550-volt supply to the street car.

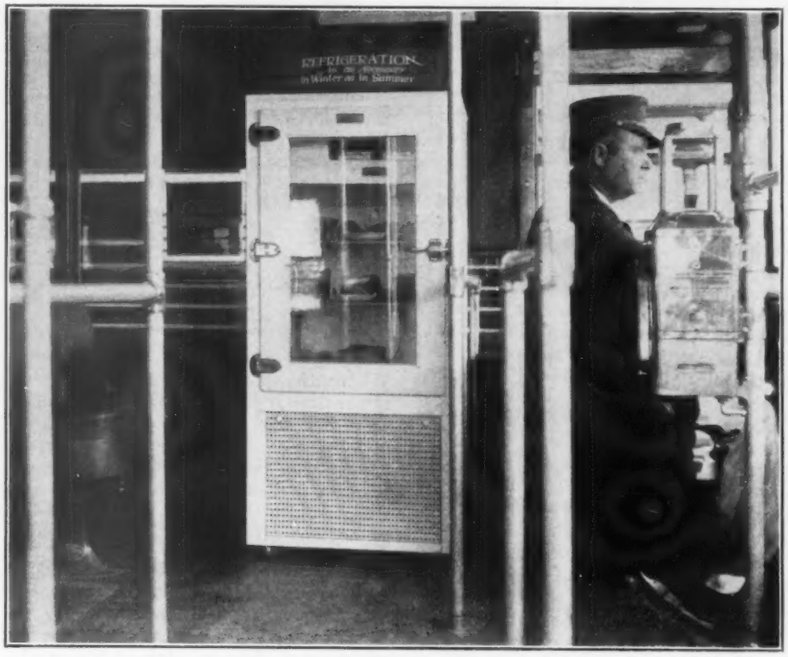
All compartments of the refrigerator are filled daily with fresh foods, arranged in a most appetizing and attractive manner, which are noticeable through the glass front of the cabinet. Prominently displayed on top of the refrigerator there is a sign calling attention to the fact that "Refrigeration is just as important in winter as in summer." A supply of literature which further explains the many advantages of electric refrigeration has been placed at various locations in the car.

The modern housewife does not look upon the refrigerator merely as an attractive piece of furniture. She knows that it performs an important and very necessary task in the home. However, those who see the unit installed on this street car are immediately convinced that, unlike the old style refrigerator with its objectionable features, the electric refrigerator is a thing of such beauty as to make it a worthwhile addition to the furnishings of any room in the home. To El Paso housewives seeing an electric refrigerator actually at work is much more effective advertising and far more convincing to them than merely telling the story would be. When there is added to this the novelty of the method used to introduce the refrigerator it is not difficult to believe that the display has been of more than passing interest.

*STREET cars have long carried advertising. But this is the first instance of a street car acting as a salesroom for the display of merchandise to the hundreds of people who board it every day.*

During a 30-day period the street car travels approximately 7,000 miles, through one of the best residential sections of the city, and hauls about 36,000 passengers. All of these passengers are live prospects and are in contact with the electric refrigerator in actual operation from 10 to 35 minutes during each trip. Thus its use is effectively dramatized and little is left to the imagination. The result is that, in the minds of many people, a desire is created for an electric refrigerator, not only by its appealing beauty, but through seeing it effectively demonstrated, even under extraordinary circumstances.

This method of advertising electric refrigerators on a street car is something new in merchandising which seems to offer unusual possibilities for popularizing this major appliance. Since the unit was first installed a great many people have called at the company's sales rooms seeking further information regarding electric refrigeration. Many of them have said they saw the refrigerator on the street car.




Electric refrigerator installed in one of the cars of the El Paso Electric Company just behind the motorman where passengers may see it in operation as they board the car.

# Organized to Sell the Complete Electric Home

## Sales Plan Focused Upon Unit Sale of $1,250 for Complete Installation Rather Than on Selling Individual Appliances

POINTING to a reproduction of a relief map of Los Angeles city and environs, upon which was shown a 20-mile radius circle, Gilbert Woodill, president of the National Home Equipment Company at Seventh and Bonnie Brae Sts., Los Angeles, declared: "That is my market. There are close to 2,000,000 people in that 20-mile circle. We are organized to sell home electrification to the people within that radius."

The organization which Mr. Woodill has devised and the purposes to which he has set that organization to work are interesting from the point of view of merchandising and from the present application of automobile selling technique to electrical merchandise. Mr. Woodill, formerly connected with Woodill-Hulse, pioneers in the electrical business in Los Angeles, and for some time also connected with the automobile selling game, is attempting to reconcile the two in a manner that will produce electric homes complete in every detail.

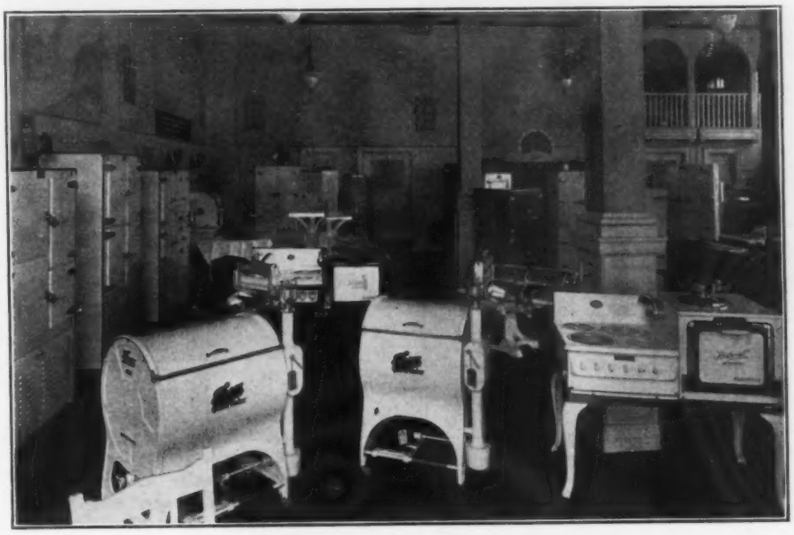
The National Home Equipment Company carries standard, nationally advertised lines of appliances only. For refrigeration it carries the Champion line; for ranges, Hotpoint; ironers, Thor; washers, Thor; dishwashers, Walker; Hotpoint air heaters; Edison lamps and, because he considers the territory a special one, Mr. Woodill has designed and is manufacturing a water-heater of his own, employing Hotpoint heating units and thermostats.

It is not the purpose of his company to enter the competitive field in house wiring. The only wiring done by the company is in connection with the installation of the electrical home equipment which it carries. George Dehn, formerly estimator with the English Electric Company, Los Angeles, is the estimator and construction superintendent handling the necessary wiring.

*AUTOMOBILE dealers sell a complete line of accessories with a car. Here is an organization which would do the same for the home.*

The sales organization consists of four or five specialty trained salesmen who make contact with prospective home builders and attempt to sell a complete home installation. For the first few months of operation the unit sales averaged $950 and it is the intention of Mr. Woodill to have this raised to a $1,250 unit sale per home. Such a unit sale will contain range, water heater, refrigerator, air heating and other domestic appliances. Little sales attention is paid to the smaller table appliances at the present time.

A home demonstrator is also a part of the organization. A model kitchen has been arranged at the rear of the main-floor salesroom from which cooking demonstrations are conducted. The demonstrator also makes visits to homes to instruct purchasers of equipment in its handling to get satisfactory results.



Sales floor of the National Home Equipment Company, Los Angeles, specializing in complete electric home equipment.

Of electric refrigeration Mr. Woodill says that previous theories as to the best time to sell units do not coincide with his experience. In the Los Angeles territory especially, he maintains there is a definite summer slump in refrigeration sales due to the fact that people are on vacations and are not spending money for home equipment at that time.

"It was the same in the automobile business," said Mr. Woodill. "You would think that automobiles would sell best in summer; we found, however, that the most sales were made in the fall and in the spring. The reason for this was that the new cars were tight and had to be broken in and the people usually bought them in time to wear them in sufficiently for use during their summer vacations.

"We find that the same condition of market affects refrigeration and that the best time to push refrigeration is in the spring, fall and winter."

As to the possibilities of development of the water-heater market, Mr. Woodill is naturally very enthusiastic. He has made considerable study of the engineering features of water heaters and finally decided to build a heater of his own design. He is an advocate of the low-wattage type of water heater. The heater he manufactures is made in 18-gal., 600-watt; 24-gal., 750-watt; 30-gal., 1,000-watt; and 40-gal., 2,000-watt sizes.

Unusual methods of insulation have been worked into it. The tank is absolutely isolated from all heat transmission even to the supports upon which it rests. The cold water intake pipe is bent to discharge directly upon the thermostat so that the slightest intake of water will turn on the current to raise the temperature of the tank. The heating element is placed near the base of the tank. Mr. Woodill is very particular as to the installation and urges strongly the lagging of all piping for hot water to prevent heat losses. He also recommends that the water heater shall be enclosed in an insulated space.

At the present time he is making a three-months test under average home conditions, and a water meter as well as a watthour meter is being used to give the correct readings from which comparisons can be made. An article upon the subject is promised Electrical West after the first series of tests ends in March.

Advertising is used judiciously and special pains have been taken to get out a piece of direct-mail advertising covering all the products handled by the company, and another for the water heaters. These are being circulated to hand-picked prospects.

# Socket-Filling Campaign Succeeds

## Advertising Campaign Stimulates Lamp Sales for Both Utility and Dealers and Increases Load

AN ADVERTISING campaign to fill empty sockets in the homes of Seattle and other cities on the lines of the Puget Sound Power & Light Company was carried to successful conclusion last fall. Of the increase of 350,000 kw.-hr. for the quarter beginning Sept. 1 at least 65,000 kw.-hr. were credited to the additional lamps placed in customers' homes through the advertising campaign, according to R. U. Mussley, sales manager.

The campaign was conducted with quarter-page ads for the period of a month. Return post cards, stamped and addressed and needing only signature and a check mark for the size and number of electric lamps required were sent out also with monthly bills. This made lamp buying easy and offered free delivery of the lamps to the home.

As an initial experiment the campaign was confined to the City of Seattle. The results were fruitful enough to extend to the entire western Washington territory of the company the next similar campaign.

The advertising copy was concentrated on the fact that in nearly every home there are empty sockets due to burnt out or broken globes and to the fact that housewives generally neglect to fill them. The campaign was launched at the time when increasing darkness made the use of light more necessary.

"You need more lights these darkening days" was the heading under which the advertisements ran. Displays also appeared when school days were just beginning. The need of proper study lights was emphasized.

At the conclusion of the campaign officials of the company checked on the figures with the following results: From Sept. 15 to Oct. 15, 9,098 lamps were sold in comparison with the sale of 4,411 lamps for the same period in 1926.

During the same period an increase in consumption of 350,000 kw.-hr. for the quarter beginning Sept. 1 was noted and it was estimated that at least 65,000 kw.-hr. could be credited to the campaign.

An offer to charge the lamps on the next month's bill was made in conjunction with the campaign.

more
LIGHT
An abundance of bright cheerful light in the home is the cheapest thing you can buy and assures—
FREE DELIVERY
TILL OCT. 15TH
on ELECTRIC lamps
ORDER TODAY
by
PHONE or MAIL
or buy from your dealer
PUGET SOUND POWER AND LIGHT COMPANY

Smaller advertisement run by the Puget Sound Power & Light Company in its lighting campaign in which the dealer was tied in.

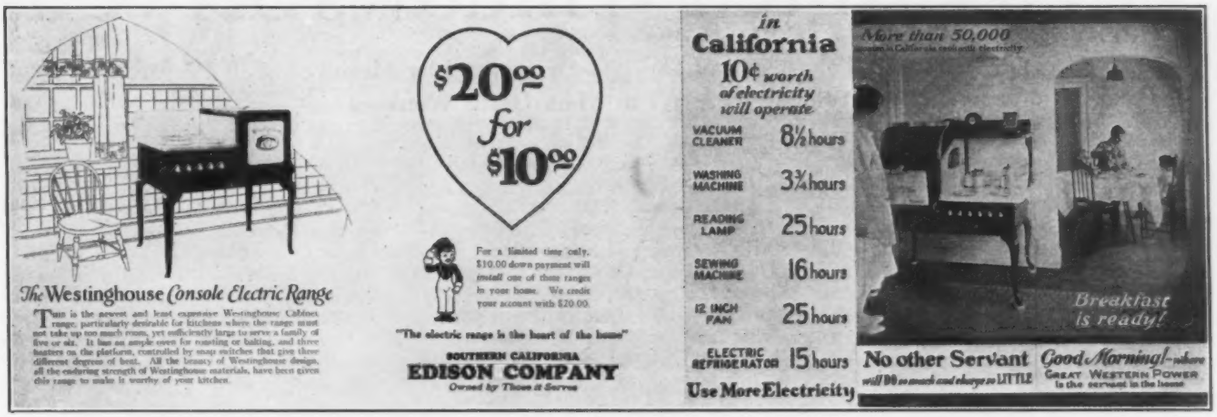
You need more LIGHT these darkening days
Replenish your Electric Light Lamps NOW for Fall and Winter—Phone MAin 5000; We'll do Our Part with Special—
FREE DELIVERY
Thousands of customers of "Puget Power" need this reminder to check up on their electric lamp supply. LIGHT is your cheapest servant. LIGHT means better eyesight, better health, cleanliness, protection. Children need soft light for study. Your kitchen may need new and bigger lamps. "Sunlight Kitchens" are the order of the day. Check up today with this reminder and 'phone us how many lamps and the size—or mail the Reminder to us before you have time to forget. We'll charge your order on your next monthly bill.
MAin 5000
PUGET SOUND POWER AND LIGHT COMPANY
REMINDER & LAMPS
Puget Sound Power & Light Co.
Electric Building, Seattle, Wash.
Please send me Electric Lamps as follows
40 Watt 60 Watt 100 Watt
Name
Address

Quarter-page advertisement used by the Puget Sound Power & Light Company in its relamping campaign last fall.

## Salesman Wins Baking Prize on Electric Range

Ralpth H. Bennett, enterprising merchandising salesman for the Southern California Edison Company in the Santa Paula district, recently stepped out and baked himself a cake in his electric range, entered it in the cake-baking contest at the Ventura County Fair, and won **first prize.** And now he has his prospects fighting to get to see him.

## *Direct-Mail Folders Which Have Promoted the Range Idea*


The Westinghouse Console Electric Range
$20.00 for $10.00
"The electric range is the heart of the home"
SOUTHERN CALIFORNIA EDISON COMPANY
Owned by Those it Serves
in California
10¢ worth of electricity will operate
VACUUM CLEANER 8½ hours
WASHING MACHINE 3¾ hours
READING LAMP 25 hours
SEWING MACHINE 16 hours
12 INCH FAN 25 hours
ELECTRIC REFRIGERATOR 15 hours
Use More Electricity
More than 50,000
Breakfast is ready!
No other Servant will DO so much and charge so LITTLE
Good Morning!—where GREAT WESTERN POWER is the servant in the home

RECENT advertising matter used by two companies in electric range campaigns in California is shown above. At the left is a reproduction of one side of the Southern California Edison Company's broadside sent through the mail in its spring Westinghouse campaign of seven weeks' duration in which 576 ranges were sold against a quota of 345. Both newspaper and direct-mail advertising were used throughout the campaign. Small ads were used, 1 col., 5 in., every day in all papers covered by the system. Four pieces of direct-mail matter were mailed to a selected list of 40,000 customers. These were mailed at 10-day intervals. It is interesting that due to the special effort to sell water heaters along with the ranges, 184 water heaters of various makes were sold during the campaign.

AT THE right above are reproduced three faces of a mailing broadside used by the Great Western Power Company to promote electrical equipment in the home. Inside, the folder is devoted one sheet to air heaters, one to refrigeration, and one to water heating. Very little type was used in the folder, the entire effect being sought by means of large and dramatic photographs. The economy of electricity was emphasized by the portion of the folder shown above, specifying the work which could be done with 10 cents' worth of electricity in California. This part of the folder ties in with the promotional advertising of the California Electrical Bureau which appeared in leading publications all over the state during 1927. It was distributed to all domestic lighting consumers on the company's books.

# Residence Kilowatt-hour Contest Launched by N.E.L.A.

THE general merchandising committee, Commercial National Section of the National Electric Light Association, announces a national contest between the sales departments of member companies to promote the intensive development of residence consumption during the year 1928.

At present the average residence consumption in this country is 400 kw.-hr., or slightly over 1 kw.-hr. per home per day. It produces an average annual revenue less than $30. This means that electricity in the average home today means no more in the daily expenditures than the value of one street-car ride or the day's newspapers—despite all that the many modern applications of electricity offer in comfort, convenience, utility and economy. Through the year the average family spends one-third as much for electric service as for ice cream soda and candy!

At the suggestion of the committee, a fund of $10,000 is being subscribed chiefly by the manufacturers of electrical equipment and apparatus to provide $9,000 in prize money and $1,000 for the expenses of the contest. A first prize of $2,000 and a second prize of $1,000 are offered to all member companies, grouped in three classes—according to their present average annual energy sales to residence customers—

Class A—451 kilowatt-hours or over.
Class B—351 to 450 kilowatt-hours.
Class C—350 kilowatt-hours or under.

Cash prizes of $2,000 or $1,000 therefore will be won by the sales departments of six power companies—the six companies who show the best and next best increases in average consumption per residence customer during the year 1928 in three classes.

### The Rules of the Contest

The rules of the contest are exceedingly clear cut and simple—

1. Participation is restricted to the sales departments of electric light and power companies who are Class A members of the N.E.L.A.
2. To enter the contest notify the residence KWH contest committee as soon as possible that you desire to compete. Then register with the committee, before May 1, the average annual consumption of residence customers over your company's system for the year 1927, calculated according to Section 3 of the "Conditions of the Contest."
3. The names of the companies participating in the contest will be announced at the next Atlantic City convention.
4. The contest will close on Dec. 31, 1928. All competing companies must register with the contest committee by April 1, 1929, the average annual consumption per residence customer for their company system during the year 1928 based on a similar cross section.
5. In registering the final figure in the contest for the year 1928, contestants must submit a report on how the gain in average residence consumption was made; that is, what sales methods were used, what load-building appliances were sold and how many, and how the campaign was organized and conducted. A simple how-we-did-it-story is what is desired. This is for the benefit of the entire industry. The contest committee will analyze these reports, tabulate the results and the experience gained and publish it for general distribution.
6. The winners will be announced and the prizes awarded at the N.E.L.A. convention in 1929.

### The Simple Conditions of the Contest

1. Notify the committee promptly that you desire to enter the contest.
2. Register your 1927 average annual residence consumption as soon as possible thereafter—not later than May 1.
3. Calculate your average residence consumption by dividing the total kw.-hr. sold by the average number of customers during the year. The total number of residence customers should be based on the number of locations at which the company supplies service for which it renders a bill or bills to an individual, firm or corporation. It should embrace all sales of electricity for residential light, heat and power service. This conforms with standard practice in reporting to the N.E.L.A. statistical department and to the United States Census.
4. The committee will make its award on the basis of the registered averages submitted at the beginning and end of this contest period, over the signature of an official of the contesting company.
5. Standing in the contest will be finally determined by a comparison of the average annual residence consumption for 1928, with the 1927 figure registered in advance.
6. In case two or more competing companies in any class should show the same kw.-hr. average increase for the contest period, the prize will go to that company having the highest average annual kilowatt consumption per residence customer for the year 1928. Or, in the unlikely event of a tie on all contest points in any class, the prize for that class will be divided equally.

The contest committee consists of C. E. Greenwood, chairman, A. K. Baylor, T. F. Kennedy, Ralph Neumuller, Earl Whitehorne.

# Well Lighted Windows Serve as

## Company Goodwill Enhanced and Services Dramatized by Means of Well Prepared Window Displays at Main Office Windows

PROPERLY lighted windows serve not only as sales helps, but as goodwill builders, and prove to be valuable assets. This is a daily occurence in many mercantile lines, where a high value is placed on window space and the highest decorative skill is employed in showing merchandise.

The proper amount of light, correctly used, is an important essential in the successful display of merchandise, whether it be a day or night showing.

Believing that the power company office should be the brightest spot on Main Street, the Pacific Gas and Electric Company is planning to bring the window lighting service in its division, district and agency offices up to modern lighting standards. The premier windows on the company's system, where the public may see how electrical illumination can be made to compete with daylight, are in the San Francisco division offices. The policy of the company is to display gas and electrical appliances and to permit the local manufacturers to use its windows for displaying their goods under the most favorable conditions known to modern science. This policy has proved to be a sales help and goodwill builder. The manufacturer displays his goods, then writes his local jobbers and distributors, who in turn, notify their employees to visit the exhibit and learn how attractive the goods are under proper display. Aside from bringing favorable comment these visits often result in changes in the merchants' window lighting, with an improved lighting installation.

The same plan is carried on throughout the smaller cities and towns. The value of a display in the company's Marysville office is indicated by the case of two tourists, a man and his wife, returning from an automobile trip to Oregon. The couple stopped at Marysville and in the evening strolled down Main Street to take in the sights. They were

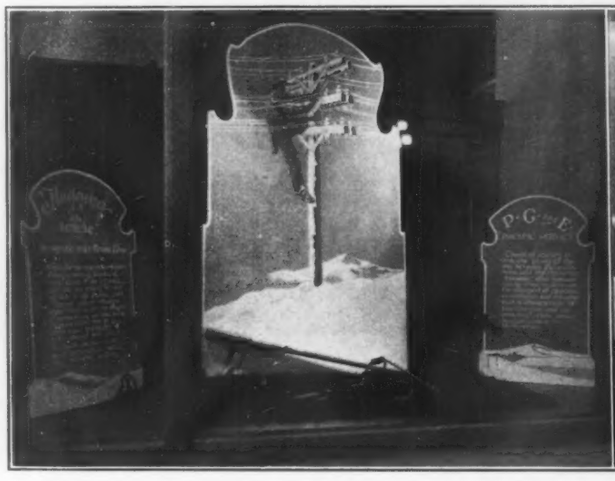
Dramatizing the service which a small motor will render as well as the low cost of operation.

attracted by the P. G. and E. window, then the brightest spot on the street. Here they found an all-enamel, white electric range displayed under highly intensified lighting and pleasing surroundings.

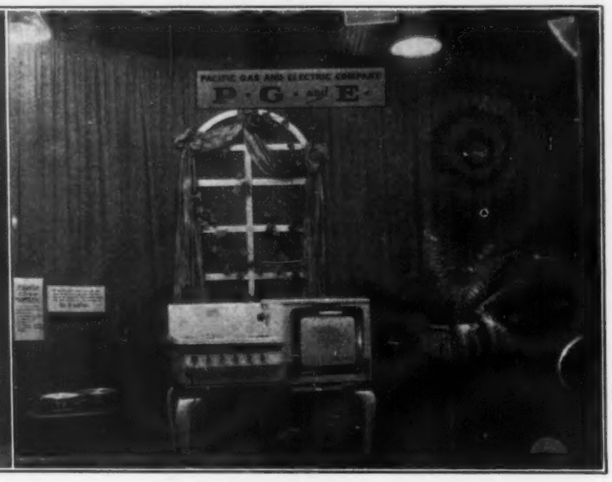
The following morning, before the office opened, the visitors were waiting at the door. Both the man and woman were deaf and dumb. A note was written to the first clerk arriving, asking the price. Then the man wrote: "I'll take that range." On learning the address, the clerk wrote: "We do not serve that district," and the man wrote: "I want that range or one just like it." The people lived in southern California and out of the Pacific Gas and Electric Company territory. A check was made for the full amount, and arrangements completed through the serving company for the installation of the range some 300 miles from the selling point.

The credit for that sale, and indeed, many others, goes to the window with the proper trim and good lighting. As with sign lighting, the electric company should lead the way. Window lighting need not be expensive to be attractive and effective. Most manufacturers provide window set-ups and dealer helps, often free of cost, and never very expensive. Progressive utility manufacturers and agency representatives are finding that good window displays with proper lighting result in increased sales and better relations with the public, and that the spirit and pride of the local office force is encouraged.

As a definite goodwill builder effective use is made of small windows at the main office of the company, 245 Market St., San Francisco. In a limited space a simple but dramatic display is made to point to the value of electric service to the public. The two pictures on this page illustrate the type of message carried by these windows. Well lettered posters, usually illustrated, bearing a condensed and terse statement of the value of the utility's service are set off by one or two actual objects used in rendering that service. These windows have been unusually attractive to passing throngs.



An arresting display at the company's main office. The lineman, "hugging an icicle" to maintain service, is made to typify the spirit of company service. Line tools add reality to the display.




A merchandise display in one of the company's district offices. In these offices, too, good window lighting is installed as an example of adequate illumination for the community.

# an Example to the Community

¶ *How Electrical Manufacturers and Jobbers Have Used P. G. and E. Windows to Display Electrical Merchandise at its Best*

# Do You Try Reselling Old Accounts

*It costs money to get names on your ledger. If your former customers now buy elsewhere a check-up as to the reasons why may bring them back to buy from your store again.*

WHEN a curious little boy poked a sharp stick into a bee-hive to see if it was loaded, he not only succeeded in satisfying his latent curiosity, but he also achieved extraordinary results.

There are many electrical jobbers, contractors and dealers, no doubt, with a number of good names on their books which need to be stirred into similar action. There may be many reasons why those old ledger accounts are "dormant" and no longer in active, everyday use, but it is just as well to find out **exactly why** each and every one of them is in that unhappy state.

The actual reasons may be manifold. The customer may have moved out of town or become deceased, or what is more to the point, may have taken undue offense at some untoward incident which took place between him and your sales help or office force, of which you are uninformed, and yet which might easily be remedied if direct contact were re-established.

Of course, if the customer has moved away or is no longer in existence the account can be safely scratched from the books as dead timber, but if still among the living and in town there is no good reason why you should not renew acquaintance again and find out what the trouble was all about. At any rate, it is always a good plan to ascertain why the customer now deals elsewhere.

Perhaps a renewal of acquaintance will turn the trick. Possibly some secret misunderstanding can be straightened out nicely. At the same time the personal contact thus established will tend to renew friendly relations again if a strained attitude of mind has existed.

### Survey of Old Accounts

Every name on your ledger is worth real money, and it is just as well not to forget that it costs something to get it there. Once you have a good account, why not hang on to it? At least, so figured one electrical dealer recently when he got busy with his old ledger accounts and picked out all the driftwood, compiling a complete list of names, addresses, and telephone numbers, with data as to when the charge account was last used, how long it had been used before it was finally discontinued, the total amount of purchases, and a statement of the customer's promptness in paying bills, as indicia of desirability of reopening that particular account. His list, when compiled, looked something like the table below.

One list contained all accounts which were not used for six months and was classed as "Class A Accounts," while those who had not bought anything on the account for a year were classed as "B" accounts, those two years old "C" and so on, while those more than five years old were classified as "antique" on a separate list, and left over for the final results on the other lists. In making up the lists, one series of sheets was marked "Class A," another "B," another "C" and so on, and then the names were entered direct from the ledger on these lists.

When completed, the lists were checked back with the telephone and ctiy directory, while those no longer listed in either were checked with a red cross for checkback with the postal authorities.

### Using the Results

These lists served a most useful purpose, not only for re-establishing contact with old customers but also forming an excellent nucleus for direct-mail advertising afterwards. Their principal use at this time, of course, consisted of checking up on the customers' whereabouts and their inclination to still further patronize the business.

"CLASS A"

| Name and Address | Telephone | Acct. Opened | Closed | Reason | Purchases | Pay |
|---|---|---|---|---|---|---|
| Mr. John Jarboe 1325 High St. | Main 551 | Jan. 24, 1925 | Dec. 1, 1926 | | 344.75 | G.P. |

G.P.—Good pay. P.P.—Poor pay. C—Cash.

After the lists were complete this electrical dealer faced three alternatives:

First—He could telephone each name on the list and talk the situation over frankly;
Second—He could set a solicitor to the task of making a personal visit to each customer and so achieve the same result;
Third—He could send out a series of personally typewritten letters to each name on the list and so first eliminate all those who responded, or he could combine all three methods.

After debating the question, he decided in favor of a series of three letters as the first step in his chain of rejuvenating these lost accounts, hoping thereby to get a favorable response from at least one-third of the list, and then to telephone all those who had phones and to send a solicitor to the remainder. His scheme worked out nicely. The first letter of the series read thus:

Some dropped in to talk the matter over. If there was any complaint every effort was made then and there to straighten it out.

*Dear Mr. Jarboe:*

Do you know why Napoleon lost the battle of Waterloo?

It was because he had lost his grip on the strings of battle. Similarly, for some unaccountable reason, not apparent from our ledgers, we have lost our grip on your business.

When a patron has been a good customer of ours for a long, long time, and then without known cause to us, suddenly stops buying here, we wonder if we are not lost and facing our Waterloo!

Won't you come in and tell us frankly why we no longer merit your business? Or use the enclosed postcard to tell us the sad story—or telephone me personally about it?

Cordially yours,

"This letter brought in its natural quota of results, about ten per cent returns on a mailing of 300 odd letters, some returning the postcard, others calling up about it, and some coming in to tell us what they thought," said this electrical dealer. "The response was so gratifying that we dispatched another letter to those not responding in 30 days, which read thus:

*Dear Mr. Jones:*

We still miss you from the ranks of the "old-timers."

Your account has not been used for months. So we're sending you this little friendly reminder to tell you that we have missed you, and to ask what has happened?

Naturally, we're wondering why we still do not see your name actively on our books, and we should like to know if there is anything we can remedy—if our electrical work and merchandise haven't been what you want or our service displeasing, or if there is anything about us that does not strike you as just right we should certainly like to know all about it.

Goor friends are rare, and we want to hold on to them. So won't you please mail the enclosed postcard today, telling us to continue your account, or explain why you want it discontinued, or telephone me about it if you cannot come in to the store?

Cordially yours,

P.S.—Just charge it—like you used to!

"Here also the response was very satisfactory, and at the end of the month many of the old accounts had purchases charged to them, while again some called up, others mailed the postcard and some dropped in to talk the matter over, voicing some slight grievance or telling us that they had no particular reason for not buying, but that they had just gotten into the habit of buying elsewhere. So we dispatched a third and final letter to the accounts who still remained unresponsive:

*Dear Mr. Smith:*

You are still one of a very few of our old customers who has not responded to our request for information as to why you stopped buying here.

If there has been any fault in our efforts to please don't decide against us by one act—it can be remedied, and we're eager to do just that!

Your money will buy as much here as elsewhere. The quality of our electrical work and merchandise is at its best. We'll admit that our prices are as reasonable, if not more so, than elsewhere. So why not come back and give us the once over again? You'd be surprised.

Cordially yours,

P.S.—We want you to use your account again. It is still on our active ledgers. Why not charge it as you used to?

"The total result of this campaign on some 300 odd accounts resulted in re-opening 141. As to those not responding, if they had telephones they were now called up and a series of questions propounded, which were carefully framed in advance, and their use varied according to the nature of the account or the personal knowledge some one had of the customer," this dealer went on to explain.

"If there was any complaint of any kind, every effort was made then and there to straighten it out, and to assure the customer that there would be no recurrence to warrant any more complaints in the future. If there was no trouble of any sort, it was, of course, easy to re-establish connections.

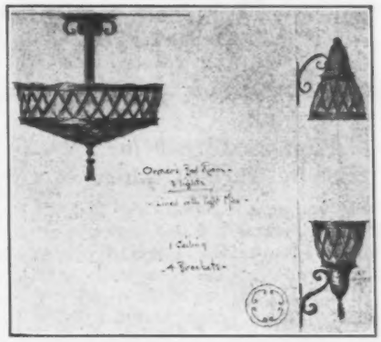
"As to those without telephones, a special solicitor was assigned to the task of making a personal call and to achieve the same results as a telephone interview. In this way we satisfied ourselves as to the balance of the accounts and we either resold them or just simply wiped them completely off our books. I believe an annual house-cleaning like this is desirable instead of letting it run on for years, and I am going to repeat the performance in a year's time and so keep in closer touch with potential live accounts which mean real money to the electrical dealer."

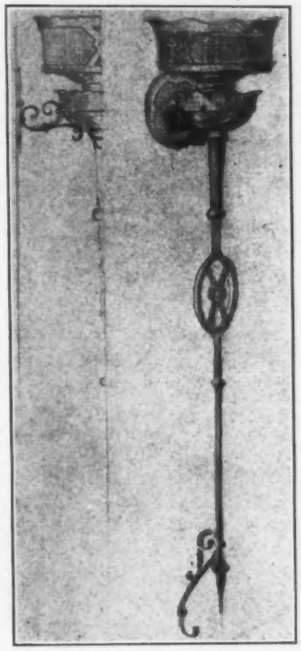
If a similar situation confronts you today, why not solve the problem by whittling a sharp stick of inquiry—it will get the same results that the small boy achieved in satisfying his curiosity, and it is also good sales-management. By poking these old hives for live bees you may, very plausibly, discover some old friend who will willingly resume business relations again, and probably some old entanglements can be ironed out nicely, and thus you may resell nearly all of your old lost accounts.

**Fishing Tackle as a Side Line**—C. W. Mowrey of the Seaver Electric Company, 120 Grand Ave., Portland, situated on the outskirts of town and on the routes followed by fishermen, finds it a profitable investment to keep a line of sporting equipment, such as fishing rods, tackle, and shells and ammunition. These and a number of small hardware items displayed by means of a counter similar to those found in the 15-cent stores, make it easy for the customer to select what he wants. Mr. Mowrey also collects telephone and light bills in his store, through arrangement with the utilities.

## *Fixture Designs Employing Shaded Light*

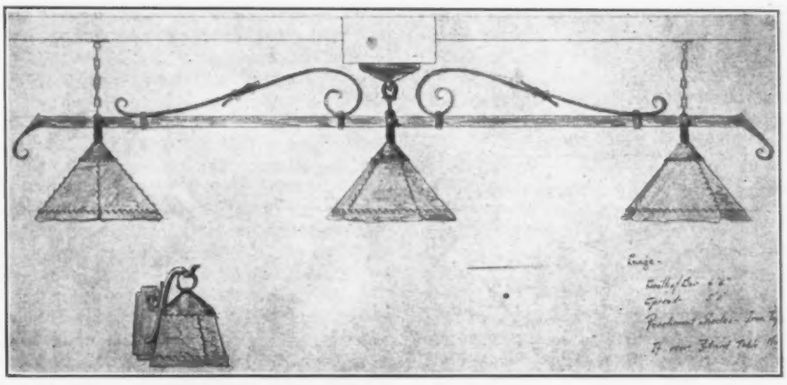
The modern high-intensity lamp, even though in a frosted bulb, is so bright that it should never be exposed bare to the eye in the home. Bare bulbs have reacted in a decreased use of electricity in lighting the average American home. Illuminating engineers advocate a change in design of lighting fixtures which will make possible the delivery of the majority of light from the fixture from unseen light sources. If bare lamps are used, they urge that such lamps be of low intensity and tinted or frosted so that they will be of decorative value only.





The intensity needed to light a room adequately should be concealed by decorative material such as that employed in these fixture designs by J. Mann, designer for the Southern Electrical Company of San Diego, Calif. The bedroom fixtures, seen in the upper right, allow for lamping to adequate intensity. The hall fixture, or urn, at the left, is interesting in design as well as effective in directing a strong light to the ceiling for diffusion. The small fixture, lower right, is used for hall lighting. A larger fixture of the same principle can be used for a central ceiling fixture.

At the bottom of the page are shown fixtures designed for a billiard room, where direct illumination is needed over the tables. The deep shades of parchment hide the high-intensity lamps. Designers of fixtures have been known to say that indirect or shaded light is not available with beauty of fixture. These fixtures demonstrate that much can be accomplished if shaded light is sought sincerely.



# News of the Industry

## Budget of $20,447,870 for 1928 Set by Three Utilities

Construction and operating budgets of the San Joaquin Light & Power Corporation, Fresno, the Great Western Power Company, San Francisco, and the Midland Counties Public Service Corporation, San Luis Obispo, provide for the expenditure of $20,447,870 during 1928, according to announcement of A. Emory Wishon, vice-president and general manager of the three utilities.

The construction budget of the companies totals $12,485,137. This provides for system betterments, additions to transmission and distribution lines, improvements for substations and power houses, and new production facilities. The budget for operating amounts to $8,580,571.

The largest single project in contemplation for the year is the construction of a new 35,000-kw. steam plant by the Great Western Power Company at San Francisco. This plant will involve an expenditure of $3,532,000. Other Great Western construction during the year will amount to $4,516,299, bringing the budget of this company alone to $8,048,299.

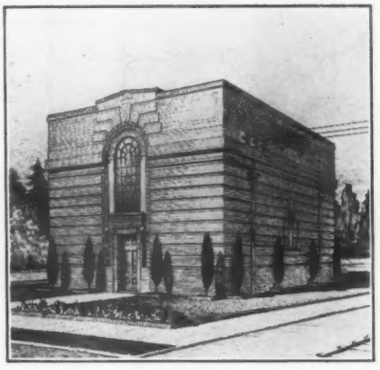
The San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation will spend $9,037,571 during the year.

Several important new transmission lines are being planned by both companies, principally in the southern part of their system. This work will cost about $719,000. Two new substations are to be erected, one at Taft and one at Fresno, and extensive improvements will be made on several other substations, the appropriation for this construction amounting to $657,130. New business requirements, including the cost of adding new consumers to the line and reinforcing distribution lines to carry the added load, have been allotted $2,187,642. New switching equipment is to be installed in both the Bakersfield steam plant and the Midway steam plant to accommodate the new 110-kv. lines being brought in there. Approximately $183,000 will be spent on the Crane Valley hydro system, and alteration work on the Merced Falls power house will cost about $100,000.

## Many New Substations Built by B. C. Electric Company

Considerable activity has been displayed during the past year by the B. C. Electric Railway Company in connection with the erection of new substations. During the year a new substation was erected at Fir St. and equipped with 1,000-kw. motor-generator set and automatic switchboard to provide railway power. A new 9,000-kw. substation was erected at Matsqui to serve the Fraser Valley district. Two additional 9,000-kw. transformer banks were installed at Horne Payne receiving and distributing station to handle the new Alouette power, and additional equipment was installed at practically all the substations throughout the Greater Vancouver, Burnaby and New Westminster districts. A new automatic transformer substation has been completed at the junction of Commercial Drive and Sixth Ave. East in Grandview district.

A new portable substation with a capacity of 1,000 kw. recently was delivered to the company and is now in service at Marpole with the object of being utilized as a booster for service



Artist's drawing of British Columbia Electric Company's proposed substation for West Vancouver.

in the Lulu Island and Fraser Valley districts. The complete equipment is mounted on an all-steel car. The convertor and switchboard are enclosed, while the transformer, oil circuit breaker and all other high-tension apparatus are of the outdoor type and are mounted on the outdoor portion of the car. The station is fully automatic, being started and stopped by load demand.

Early this year a $20,000 automatic substation will be erected at the end of the Sapperton car line on the Burnaby Lake right-of-way. The substation will be automatically operated and will be of the outdoor type containing three 500-kw. transformers. Another new $50,000 substation has been planned for West Vancouver, and work on this substation will be commenced within a month or so. The substation will be of reinforced concrete construction and automatically operated.

## Pasadena, Calif., Makes Survey of Street Lighting Cost

The Department of Light and Power of the City of Pasadena, Calif., has under way a survey which will disclose the cost of the operation of the street lighting system.

The cost of lighting the streets of Pasadena in the fiscal year of 1927 and 1928 was $140,000 for current consumed. It is anticipated that with the large number of streets on which new lighting systems are being installed this amount would normally be considerably increased during the fiscal year of 1928 and 1929.

When the results of this survey are known it is hoped, according to officials of the department, that recommendations may be made as to the amount of current which should be assigned to different streets in the city, both residential and business, and a decided saving effected thereby.

One of the proposals under consideration is said to be a standard lighting plan for Pasadena. Long Beach and several other cities in California are reported to have such a plan and are able materially to reduce their street lighting costs because of it. Under such a plan, a certain amount of electricity is assigned to residential streets and a certain amount to the business streets, and when property owners want lights of higher candle power requiring more current they must pay for the excess. At the present time 29 per cent of the City of Pasadena street lighting is in ornamental systems. There are 244 miles of lighted streets within the city, and, with the exception of a very few streets on the outskirts where territory is not yet built up, every street has some kind of lighting system.

## Second Unit Being Installed in Seal Beach Steam Plant

Installation of a second 48,000-hp. generating unit is under way in the Seal Beach plant of the Los Angeles Gas and Electric Corporation. The installation of this unit will double the present capacity of the plant, whose ultimate capacity has been set at 280,000 hp.

Three new 2,500-hp. boilers and a 45,000-sq.ft. condenser, together with the necessary pumps and switching apparatus, will accompany the installation of the generator. The new unit is expected to be ready to operate about Aug. 1, 1928, and when in operation will make the total capacity of the Los Angeles Gas and Electric Corporation practically 200,000 hp. in its two steam generating plants.

## Portland Electric Power Co. to Buy Northwestern Electric Co.

Announcement was made Feb. 18 by Franklin T. Griffith, president of the Portland Electric Power Company, and Guy W. Talbot, president of the Northwestern Electric Company, that the Portland Electric Power Company would purchase the competing Northwestern company and make a material rate reduction, provided the deal is sanctioned by the people of Portland at a special election, which will be held in April at the expense of the two power companies. Operating economies estimated at approximately $300,000 a year resulting from the consolidation will be passed on in their entirety directly to customers in the form of reduced rates applicable first to the domestic customer and second to the other classes of business.

The franchise of the Northwestern Electric Company, which expires in 1937, contains a clause prohibiting the sale of the property to a competing company without the consent of the City Council. The companies have suggested that the council submit to the voters an ordinance permitting the consolidation. Promised domestic rate reductions will be made public before the people are asked to vote on the merger.

The Northwestern Electric Company, purchased by the American Power & Light Company from the Fleishhacker interests in 1926, is valued at $23,000,000. E. W. Clark & Company of Philadelphia now hold the controlling interest in the Portland Electric Power Company property valued at $81,000,000. The joint properties have a combined steam and hydro generating capacity of 232,000 hp. and approximately 140,000 customers.

## Successor to Division Manager Named by P. G. & E. Co.

Announcement has been made by the Pacific Gas and Electric Company, San Francisco, that H. B. Heryford, for the past seven years manager of the company's West Side Division with headquarters at Red Bluff, Calif., has been appointed division manager of the San Joaquin Division with headquarters at Stockton. He succeeds the late Charles S. Northcutt.

The West Side Division has been abolished, part of its territory being added to that of the Shasta Division under the management of G. R. Milford, and the rest to the De Sabla Division with I. B. Adams manager.

H. B. HERYFORD

Mr. Heryford has been connected with the gas and electric industry in California for the past 25 years. He started his career in the gas and electric business at Colusa where he entered the employ of the Colusa Gas and Electric Company in March, 1903. Three years later he was made manager of the company. In 1909 he became manager of the Chico district of the Pacific Gas and Electric Company, and then later assumed greater responsibilities in the management of the West Side Division in 1921. His transfer to Stockton now makes him manager of one of the largest and most important divisions of the Pacific Gas and Electric Company's system.

## Electric Liner on Maiden Trip Arrives in San Francisco

The liner California, electrically driven and equipped throughout, arrived in San Francisco on her maiden voyage from New York Feb. 13.

The California was built by the Newport News Shipbuilding & Drydock Company for the International Mercantile Marine Company for use in intercoastal service by the Panama Pacific Line. She is 601 ft. long, 80 ft. wide, has capacity for 8,000 tons of freight and 750 passengers, and a maximum speed of 21¾ statute miles per hour. It is expected she will reduce the existing 15-day passage time between New York and California by two days.

Electricity is employed in all departments of the ship. The main power plant consists of two marine type steam turbines, each rated at 6,750 shp., but having a maximum capacity of 8,500 shp. Each turbine is direct-connected to an alternating-current generator rated at 5,250 kw. and having a maximum continuous rating of 6,600 kw. There are two main propulsion motors, one direct-connected to each propeller shaft, and each being of the synchronous induction type, rated 5,250 kw. or 6,750 shp. Power for the refrigeration plant, pumps, elevators and all ship's auxiliaries, including lighting, is supplied by four 500-kw., turbine-driven generators which furnish direct current for this purpose and also for exciting the propulsion motors.

Galley equipment is operated entirely by electricity, as are also the heating and ventilating systems throughout the ship. Numerous other types of electrically operated equipment justify the title "electric liner" given the ship by her owners.

## Los Angeles Corporation's Rates to Be Investigated

Following the filing with the California Railroad Commission of a revised schedule of rates applicable to street lighting service furnished the City of Los Angeles by the Los Angeles Gas and Electric Corporation, the commission has instituted investigation into all electric rates charged by that company for the purpose of determining whether any of them is excessive or discriminatory.

The proposed schedule filed Feb. 15 and, if approved, to take effect March 1, would reduce the existing rates by 25 per cent. The commission held that the extent of the proposed reduction was such as to call for an investigation into the other rates charged by the company.

## Distinguished Services in Advertising Win Gold Medal for James H. McGraw

James H. McGraw, president of the McGraw-Hill Publishing Company, Inc., New York, has been awarded the Gold Medal for distinguished contemporary services to advertising, in the 1927 Harvard Advertising Awards. These awards, consisting of certain annual prizes, were founded by Edward W. Bok in 1923. The medal, which is the greatest honor in the series of the awards, was presented to Mr. McGraw because of his life-long service in the upbuilding of higher standards in advertising in the business press of the country.

The awards were announced at a dinner in honor of the winners held at the Harvard Business School, Feb. 17. Mr. McGraw, who was absent from New York, was unable to receive the medal personally and it was received for him my Malcolm Muir, vice-president of the McGraw-Hill Publishing Company, Inc., who read Mr. McGraw's address on the subject of "Advertising and the Maintenance of Prosperity." In making the award Prof. O. M. W. Sprague, acting dean of the Harvard Business School, spoke of Mr. McGraw's pioneering work in the cognition of advertising's relation to marketing and of his constructive services in the upbuilding of the highest advertising practices among the organized business press.

## Favorable Report on Boulder Dam by House Committee

A favorable report on the Swing-Johnson Boulder Dam Bill was ordered Feb. 3 by the Committee on Irrigation and Reclamation of the House of Representatives. The committee specified, however, that the text of the report is not to be filed prior to March 15. This action was taken so as to give the seven states directly interested another opportunity to reach an agreement among themselves.

A minority report will be filed by Representative Douglass of Arizona. Additional minority views will be filed by Representative Leatherwood of Utah; Representative Allgood of Alabama, and Representative Winter of Wyoming.

# California Commission Approves Reduction in Rates of Four Utilities

Schedules reducing the rates for electricity approximately 14 per cent, which were filed Feb. 21 by the Pacific Gas and Electric Company, the Great Western Power Company, the San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation, have been approved by the California Railroad Commission. In addition the commission has included a new schedule for agricultural power service which eliminates the present optional rates and provides a new rate structure reducing the rates to a majority of agricultural power users.

At the hearing, J. J. Deuel and L. S. Wing, representing the California Farm Bureau, had made a plea for reduction in power rates in the agricultural belt, and J. J. O'Toole, San Francisco city attorney, had expressed dissatisfaction with the distribution of the reductions which, he said, discriminated in favor of certain classes of consumers.

In ordering the new rates into effect the commission made the following statement:

"Presentation of evidence in these proceedings has not progressed to the point where the commission may determine whether the proposed reduction is all that should be made, or whether groups of consumers not affected by the proposed changes have been fairly dealt with. We have the opportunity, however, of giving immediate assent to a change in rates that injures no one, but benefits a large group of consumers to the extent of over $150,000 a month. The present proceedings should be continued to determine the questions that have been raised, but, in the meantime, and subject to any changes that may later be found desirable, the proposed rates should become effective with the least possible delay."

The new lighting service rate, including household appliances and small power service are to go into effect March 1 and the new combination domestic service, general power and agricultural rates on April 1.

The lighting rates in incorporated cities provide a minimum service charge of 40 cents and 5 cents per kw.-hr. for the first 200 kw.-hr., 4 cents for the next 800 kw.-hr., 3 cents for the next 2,000 kw.-hr. and 2½ cents for all over 3,000 kw.-hr. In unincorporated territories the service charge will be 70 cents and 6 cents, 5 cents, 4 cents and 3½ cents in the blocks as stated. The combination heating and cooking rate fixes a service charge of 40 cents and 5 cents per kw.-hr. for the first 30 kw.-hr., 3½ cents for the next 140 kw.-hr. and 1½ cents for all power used in excess.

For residences, flats or individual apartments of more than six rooms 5 kw.-hr. for each additional room will be added to the first block of 30 kw.-hr.

Where no major equipment is installed the minimum charge is the service charge. Where major equipment is installed the minimum charge will be the service charge plus 40 cents per month for each kilowatt of major equipment in excess of 2 kw. "Major equipment" includes any device having a capacity in excess of 1 kw.

In unincorporated territory the rate will be 6 cents for the first 30 kw.-hr. and 4 cents for the next 140 kw-hr. and 1½ cents for all over that amount.

## Edison Company Gang Foreman Is Awarded Insull Medal

Edgar P. Fees, gang foreman of the Southern California Edison Company, recently was presented with the Insull Medal for saving the life of Thomas M. Elder. Fred G. Hamilton (left), assistant manager of operations for the company, acting as representative for Mr. Insull, made the presentation.

The accident occurred when Mr. Elder, who was working on a new pole, accidentally brushed against a 4-kv. circuit. He was immediately frozen to the wire and could not get clear. A lineman on an adjoining pole shook the wires, and Mr. Elder dropped on to his safety belt, apparently dead. He was lowered to the ground immediately, and Mr. Fees began the work of artificial respiration by the Schaeffer prone pressure method. Following fifteen minutes of this work, Mr. Elder again began to breathe.

## Northwestern Company Plans Third Elwha River Plant

Application for appropriation of 1,200 sec.ft. and storage of 65,000 acre-ft. of water from the Elwha River recently was filed by the Northwestern Power & Light Company, Port Angeles, Wash., for the purpose of power generation. The proposed plant, which will be known as the Rica Canyon project, will have an estimated capacity of 22,000 hp. and will cost approximately $2,200,000. Plans include the erection of a 300-ft. concrete arch type dam.

The Northwestern company already has two plants on the Elwha River, Elwha and Glines Canyon.

## Request Delay in Approval of Herminghaus Settlement

Request has been made by the Federal Power Commission that the California Railroad Commission defer for a reasonable time its decision on or approval of the settlement made by the Southern California Edison Company with the Herminghaus heirs.

The Supreme Court of California having upheld the riparian rights of the Herminghaus estate and enjoined the Southern California Edison Company from impounding the waters of the San Joaquin River so that the Herminghaus lands might continue to reap the benefit from the annual overflow, the power company arranged to purchase the lands in question.

In its request the Federal Power Commission points out that the United States was not a party to the suit and had no opportunity to have its rights adjudicated; that the Southern California Edison Company is a licensee of the United States and as such in the operation of the licensed reservoirs is exercising the rights of the United States; that the United States not being a party to the Herminghaus case, is not bound by the decision and the questions presented in that case are open to retrial in the case of other riparian owners.

The attorney-general of the United States is now considering the form and advisability of a suit to be brought in the federal courts to test the rights of the United States in connection with cases of the character above noted.

## Rights Granted for Z-Canyon Project in Washington

Rights for the appropriation of 8,500 sec.-ft. of water from the Clark's Fork of the Columbia River and storage of 6,000 acre-ft. have been granted to Hugh L. Cooper of New York City by R. K. Tiffany, Washington hydraulics supervisor. The water is to be used in connection with a power development project at Z-Canyon, near Metalline Falls, Wash.

Plans include the erection of a dam 415 ft. high and a power house with an estimated output of 260,000 hp. at an approximate cost of $17,600,000.

The permit issued is a departure from accepted Washington practices, and its form only recently was sanctioned by the state's attorney general. In accordance with the limitations placed by Supervisor Tiffany, a perpetual allowance of 7,000 sec.-ft. of water is allowed, with a subsidiary allowance of 1,500 sec.-ft. only for the next 50 years. At the end of that time, in the event that there is still ample water for the carrying out of the Columbia Basin irrigation project, in which the four Northwest states are interested, the subsidiary portion of the allowance then may be renewed, wholly or in part.

A few months ago Mr. Cooper's applications for water rights were rejected on the grounds of conflict with the state's plans for the Columbia River Basin project.

## *Balch Afterbay Dam Finished*

Completion of the Balch afterbay dam, 1,600 ft. below the Balch power house, has been announced by the San Joaquin Light & Power Corporation, Fresno, Calif. The dam, which is 170 ft. long at the crest and 75 ft. high, was erected to provide regulation of the stream flow of the North Fork of the Kings River so as not to interfere with the constant flow of water used for irrigation in the valley below. During periods of low stream flow while there is not sufficient flow to operate Balch plant efficiently water will be stored in an upper reservoir. After passing through the power house water from the lower reservoir formed by the afterbay dam will be released in volume equal to the flow as recorded at the gaging station.

To find solid rock for the foundation extensive excavation was necessary, as shown in the view at the left. Completed dam is shown above.

## New Positions of Two Arizona Utility Men Announced

William C. Hornberger, for 26 years associated with the Central Arizona Light & Power Company, Phoenix, has become vice-president and general manager of the Arizona Edison Company, a subsidiary of the Peoples Light & Power Company, which is a holding company of G. L. Ohrstrom & Company, Inc. This corrects the statement made in Electrical West, Feb. 1 issue, p. 112, to the effect that the Peoples Light & Power Corporation was a W. B. Foshay Company holding.

The Arizona Edison utilities include those in Globe, Miami, Douglas, Bisbee, Safford and Thatcher. The Arizona Edison Company will have its state headquarters in Phoenix, and also will maintain branch offices in each point where the company is supplying light, power, gas or water.

A. F. Morairty, sales manager of the Central Arizona Light & Power Company, has been appointed assistant general manager to fill the vacancy created by Mr. Hornberger's resignation. Mr. Morairty recently was elected to a seat on the board of directors of the Arizona Utilities Association. He is also a member of the board of directors of the Pacific Coast Electrical Association.

## Federal Trade Commission to Conduct Investigation

*Washington Correspondence.*

By a vote of 46 to 31 the Senate, after an unusually acrimonious debate, on Feb. 15 approved the George amendment to the Walsh resolution under which the investigation of the electric light and gas industries will be conducted by the Federal Trade Commission. The resolution, as adopted, includes an amendment by Senator Black of Alabama which requires the commission to report each 30 days on the progress of its work and on the completion of the investigation to make available the stenographic report of the evidence taken by the commission. As finally adopted, the resolution empowers the commission to inquire into the expenditures of money which may have been made to influence public opinion in the matter of municipal or public ownership. Investigation of campaign contributions was limited to those that may have been tendered in connection with the election of president, vice-president and members of the Senate.

## Correct Time by Electricity New Service Offered

A new electrical service—the furnishing of correct time—has been offered to users of current supplied by the Los Angeles Gas and Electric Corporation, Los Angeles, The Great Western Power Company, San Francisco, the San Joaquin Light & Power Corporation, Fresno, and the Midland Counties Public Service Corporation, San Luis Obispo. This service is furnished through the Telechron, an electric clock, which may be connected to electric light socket or convenience outlet. These Telechron clocks may be obtained through jewelers and other dealers.

The clocks are operated by synchronous motors which revolve in unison with the generators in the power house. Correct time, checked daily by U. S. Observatory time, is indicated by a master clock. On this clock also is a dial on which two hands make one complete revolution in five minutes. One hand is correct as to time, while the other hand indicates the speed of the generators. Any variation in the speed of the generators is noted at once and adjustments made in the power house to bring the unit into time. A difference of half a second is discernible at once. Similar regulating clocks are maintained in the various power houses on the four systems which provide additional checks on the time and speed of the generators. Close regulation which is maintained over the speed of the generators guarantees successful operation for individual clocks.

**Bonnington Falls Plant Nearing Completion**—Permission to divert 4,500 to 5,000 sec.ft. of water from the Kootenay River for power purposes has been granted the West Kootenay Power & Light Company, Rossland, B. C. This is preparatory to putting into operation the company's new 60,000-hp. hydro-electric plant at Slocan Pool, Bonnington Falls, which is expected to be completed next August.

## Modesto District's Second Line Making Good Progress

Construction work on the Modesto Irrigation District's direct transmission line from Modesto to Don Pedro is progressing rapidly and completion during the spring months is assured, according to B. W. Creim, chief electrical engineer of the district. The transmission line, which runs along the north side of the Tuolumne River, is to be 40 miles in length.

The construction of this second transmission line will insure the district against interruption in service, according to Mr. Creim.

# A. I. E. E.

**San Francisco Section**—W. S. Peterson, of the Los Angeles Bureau of Power and Light, will be the speaker at the regular monthly meeting of the Section to be held at the Engineers' Club March 30. His subject will be "The Mechanical Movement of Line Conductors Under Short Circuit Stresses." Dinner will be served at 5:45 p.m.

**Vancouver Section**—"Impressions of a Recent Visit to Europe," by F. J. Bartholomew, will be a feature of the program of the regular monthly meeting to be held March 6. At the meeting on April 3 H. M. Lloyd will discuss "Railway Motors."

# Pacific Coast Electrical Association

## West and Northwest Hear Talk on "Romance of Power"

Charles M. Ripley, engineer, economist, author, and for the past eleven years associated with the publicity department of the General Electric Company, Schenectady, spent the greater part of two months in the Northwest and Pacific Coast territory on a nation-wide tour sponsored by the Public Relations Section, N.E.L.A. During the trip he delivered an illustrated lecture on the "Romance of Power."

He spent a large part of the month of January in the territory of the Northwest Electric Light and Power Association where he visited Seattle, Portland, Spokane, Kalispell, Mont., and Baker, Ore., with many engagements in the smaller towns in the vicinity of these centers. Early February was given over to Boise, Idaho, and Salt Lake City, whence Mr. Ripley went to San Francisco on Feb. 13, to cover the territory of the Pacific Coast Electrical Association. While there he spoke before a meeting of the San Francisco Electrical Development League and at a large evening meeting of utility employees and the general public. He also spoke in Oakland, San Jose, Santa Cruz and Fresno prior to his departure for Honolulu on a vacation. Upon his return he will continue his lecture tour.

CHARLES M. RIPLEY

His lecture, which brings out forcibly the effect of the use of power on production, wages, purchasing power and standard of living in this country in contrast to other countries, is illustrated by slides taken from photographs gathered from many parts of the world on his world travels. It is delivered before groups of utility employees, business men, schools and colleges, and labor organizations.

## Business Features of Annual Convention Outlined by Program Committee

Plans thus far completed for the twelfth convention of the Pacific Coast Electrical Association indicate that this meeting will be one of the most interesting ever conducted by the organization. The convention will be held June 12-15, inclusive, at the Hotel Huntington in Pasadena.

Thus far the attention of the program committee has been centered on the business features of the meeting, and an outline of the plans follows:

One of the departures from former conventions is the great number of general sessions which have been provided, on the theory that the routine work of exclusive interest to the members of various sections can best be handled in the mid-year meetings and that the time of the convention delegates should be focused on matters of general interest.

Only one period will be devoted to parallel sessions, Tuesday afternoon, all of the other sessions being arranged for the attendance of all the delegates. Encouraged by the success of the three-minute speaking contest at the Santa Cruz convention, the Advertising-Publicity Section again will sponsor this feature which will be used for the luncheon program on Tuesday noon. The president's dinner to company executives and the president's reception to the industry will be held Tuesday evening.

At the general session on Wednesday morning each section will present an illustrated theme, "What Can This Section Do to Promote Load Building?" A suitable prize will be awarded to that section which receives the highest score on its presentation, as determined by a secret committee. The luncheon for past presidents of the association will be held Wednesday noon, and at the same time a luncheon in honor of Mrs. Frost will be given by the women, with Mrs. Creveling, chairman of the Women's Committee, as hostess.

The public relations meeting will take place on Wednesday afternoon, the general session program supplied by the sections Thursday morning, the sports program Thursday afternoon, and the public policy meeting Thursday evening.

In a desire to secure the attendance of every company executive within the territory served by the association, and also to conserve their time, the program has been so arranged that an executive who arrives Tuesday afternoon may get the cream of the convention, and leave, if necessary, on Thursday evening.

Another innovation is the plan for Friday noon, which provides for a number of group luncheons conducted by the several sections giving the retiring chairman an opportunity to pass his authority along to the incoming chairman who can then outline his work for the coming year, thus avoiding the loss of time during the summer, which in the past has been required for organizing the new committees. The Friday afternoon program will be given over to the general theme, "Where Will Our Future Business Come From?"

In place of the usual formal banquet there will be a cabaret dinner on Friday evening, followed by dancing.

Tentative plans for entertainment, details of which will be announced later, indicate that this feature will have an unusual appeal.

Arrangements have been made with the hotel for sufficient space so that a number of small exhibits may be made, and any manufacturer having a new device which he would like to show to the delegates may set it up in this room. There will be no charge for this service, with the possible exception of a porter's fee for truckage and cleaning up after the convention. Manufacturers and others interested should correspond with A. B. Wollaber, district manager, Southern California Edison Company, Pasadena.

## Three Universities Plan Short Courses for Metermen

Under the auspices of the meter committee of the Engineering Section, Pacific Coast Electrical Association, short courses for metermen will be held at the California Institute of Technology, Pasadena, March 19-24 and at the University of California, Berkeley, May 21-26.

At Berkeley, as in the past, the course will be divided into two groups. The elementary or "A" group, is intended for men whose technical education and experience in meter work are limited. The advanced or "B" group will be revised this year so that it will appeal to the men who have previously had these courses. In addition to the lectures, experiments, problems and other work connected with the courses, lectures of general interest are planned regarding recent developments in the construction of watthour meters and rotating standards, electric rates, supervisory control, the oscillograph and its use, and a film of the Weston Company on electrical measuring instruments. The fee for the course will be $15 per enrolled student. Anyone interested may obtain information and application blanks by writing to T. C. McFarland, Mechanics Building, University of California, Berkeley.

Information relative to either of these courses also may be obtained from the chairman of the meter committee, W. N. Lindblad, care Pacific Gas and Electric Company, 4225 Hollis St., Emeryville, Calif.

The University of Arizona, Tucson, also is planning to conduct a short

course for metermen, April 12, 13 and 14. Inquiries directed to Prof. James C. Clark, professor of electrical engineering at the University of Arizona, will bring information on the course.

**Transportation Section to Meet**—On March 9 the Transportation Section, P.C.E.A., will hold a meeting in the San Diego Consolidated Gas & Electric Company Building, San Diego.

# Northwest Electric Light & Power Association

## Public Relations Essays Planned by Three Committees

Following out the plan to secure a greater interest in public relations among the rank and file of company organizations, three committees of the Public Relations Section, Northwest Electric Light and Power Association, are arranging for essay contests. Part of the plan involves recognition of the winning essays as part of the section's program at the June convention.

It is expected that companies will conduct elimination contests among their own organizations, offering such prizes as seem suitable, and entering the company winners in the association contests. An outline of the contests sponsored by the three committees is as follows:

**Women's Committee**—Mary K. Walsh, The Washington Water Power Company, Spokane, chairman.

Subject: "The Woman's Role in Public Relations."

Contestants: (a) Women employees of utilities and women employees of manufacturing companies; members of women's committee, Northwest division, with the exception of members at large and company chairmen. (b) Wives of utility employees who are members of women's committee.

Awards: Classes A and B $25 each, contributed by the association, and free trip to annual convention, if sanctioned by company; should a Portland contestant win in the final contest in either class such winner will be given $25 in cash by the company with which affiliated, if convention is held in Portland.

**Committee on Employees' Relations With the Public**—George C. Sawyer, sales manager, Pacific Power & Light Company, Portland, chairman.

Subject: "Employees as a Factor in Public Relations."

Contestants: All employees except officers, officials, general office department heads, and district managers.

Awards: $25 in cash contributed by the association, and a free trip to the annual convention, if sanctioned by the company.

**Customer Ownership Committee**—Dwight Ware, manager, Puget Sound Power & Light Securities Company, Seattle, chairman.

Subject: "Why Our Customers Should Be Our Partners."

Contestants: All employees except officers, officials, general office department heads, and district managers.

Awards: $25 in cash contributed by the association, and a free trip to the annual convention, if sanctioned by the company.

Note: Awards cover winners in final or association contests and not company contests, each company providing such awards as it sees fit, if any.

The proviso on awards to Portland contestants, as stipulated in the women's committee contest, applies equally to the other two contests.

# Much Profitable Discussion at Midwinter Meeting of Commercial Section

Complete reports were heard from home and industrial lighting, street and highway lighting, commercial cooking, competitive power, industrial heating, domestic range, and general merchandising committees at the third annual midwinter conference of the Commercial Section, Northwest Electric Light and Power Association, held in the new Public Service Building, Portland, Feb. 20-21, 1928. Discussions on all these reports and, in addition, on rural electric service and refrigeration took place in turn, the most extended and controversial being that on rural extension policies, and on appliance and range merchandising.

After calling the meeting to order and outlining its purpose, J. C. Plankinton, sales manager, Northwestern Electric Company, Portland, section chairman, called on A. C. McMicken, general sales manager, Portland Electric Power Company, and president of the Northwest association. He directed attention to the value of such meetings, and stated that the Northwest led other sections of the country in residential consumption and commercial lighting largely because the power companies here had been active business builders and merchandisers.

Reporting for the home and industrial lighting committee, Fred Zaugg, illuminating engineer, Northwestern Electric Company, presented the lighting talk, with demonstration, which is being delivered by his committee before luncheon clubs throughout the territory. Clark Baker, National Lamp Works, Oakland, told of a plan for committee activity next year by which education on school lighting could be disseminated in the territory.

### Street Lighting Load Profitable

The cost of street lighting can be justified to municipalities on the basis of the saving it entails in the cost of accidents and crime, stated W. M. Hamilton, manager, Portland Electric Power Company, Salem, Ore., in reporting for the street and highway lighting committee, of which he is chairman. The committee, having shown in last year's report that street lighting is a profitable load for the utilities, has undertaken the second year's work of a three-year program, that of presenting data to be used in selling street lighting to municipal authorities. The report tabulated figures gathered from many cities in the territory grouped as to size, showing the present cost of street lighting per capita, the percentage this expense bears to the expense of the police departments and the percentage it bears to the total municipal expense. It was suggested in the discussion of the report that cognizance be taken of the area lighted and the density of population, so that true comparisons might be made as between the different cities in each group.

R. W. Faville, assistant sales manager, Northwestern Electric Company, chairman of the commercial cooking committee, stated that this year's committee work consisted of gathering data on the cost of electric fuel per unit of output in cooking and baking operations, with the idea of assisting salesmen to secure this business. A. B. Chambers, commercial cooking salesman, Portland Electric Power Company, gave the results of some of the studies the committee had made on different sized baking installations. Discussion centered around rates on this class of business and brought out the fact that since ovens are pre-heated during the early morning valley and are entirely off by the evening peak, baking installations should be entitled at least to the regular power rate or a special rate designed to encourage this business.

### Competitive Power Survey

A survey of the territories of four utility companies by the competitive power committee disclosed some 36,000 hp. in steam, oil and gas engines satisfactorily competing with central station electrical energy, according to the report of W. H. McMurray, power sales engineer, Pacific Power & Light Company, Yakima, Wash., chairman of the committee. Steam was the principal competitor and found its main application in the woodworking industry and in laundries.

That the use of steam in woodworking plants is occasioned by the production in those plants of waste wood was brought out in the discussion by E. E. Scofield, industrial engineer, The Washington Water Power Company, Spokane. He showed that in communities in which a good heating use could be found for such waste fuel the possibility of electrifying such plants was greater. He stated that in plants driving their machines from a steam-driven line shaft the job of electrification was more difficult than it was in plants generating their own current by steam turbo-generators and distributing this current to individual motors on the machines. He cited one such plant on which a study indicated that it could pay as high as 2 cents per kw.-hr. for central station energy.

Discusing the laundry situation, J. D. Scott, commercial engineer, Portland Electric Power Company, showed that the use of high-pressure steam in the laundry process was responsible for the use of this form of motive power for the laundry machinery. A study of a medium sized laundry indicated that it would have to receive a rate of less than 1½ cents a kw.-hr. to make electri-

fication economically feasible. General discussion on the uses of wood waste brought out the increasing use of such fuel in heating applications in industry and the home.

### Industrial Heating Survey Recommended

Stating that the industrial heating load represented the largest single field for load-building in the territory, the report of the industrial heating committee by J. D. Scott, chairman, recommended that a survey be made which would show executives what the possibilities are so that they could determine whether they desired to undertake the promotion expense necessary to secure it. Such a survey should do more than merely list the applications, stated the report. It should show what heat problems existed at present in actual plants, with a description of the size and type of the individual loads. Only from such a study could the companies determine whether there might be sufficient net revenue in the load to make it profitable. A standard form for such a survey is supplied by the national committee.

In the absence of J. C. Scott, agriculturist, Puget Sound Power & Light Company, Seattle, chairman rural electric service committee, no committee report on this subject was presented. General discussion centered around rural extension policies, rates and conditions of service for farms and rural communities. Frankness prevailed and many ideas were brought out relative to the commercial and public relations aspects of the different policies in effect. Also attention was called to C.R.E.A. Bulletin, Vol. IV, No. 1, just distributed, in which all the best information gathered by the state committees has been described and tabulated.

### Range Report

As a means of stimulating the companies to continue agressively to seek range business, the report of the domestic electric range committee will show the number of ranges sold by the companies in 1927 with the amount of revenue added by these ranges, according to report of the chairman, R. B. McElroy, assistant sales manager, The Washington Water Power Company. Also will be shown the total number of ranges existing on the lines of the member companies at the present time with the total revenue produced by them. A further activity of the committee will be to ascertain to what extent the equipment used by domestic science departments in the state universities and colleges in the territory has become obsolete or out of date, with a study of the means to be taken to secure new and modern equipment for them.

A round-table discussion of range selling policies provoked a second flood of healthy argument, in which campaigning, "sale" advertising, price cutting, premium giving, salesmen's bonuses, dealer relations and department store methods were aired at length without restraint.

### Small Appliance Sales

To show that small appliance sales had been somewhat neglected, V. H. Moon, appliance sales superintendent, Pacific Power & Light Company, Portland, chairman of the general merchandising committee, tabulated the results of a survey of ten companies' 1927 sales of ten small appliances per 1,000 residential meters, giving the figures for the high company, the low company, the average, and, for comparative purposes, the figure for each appliance in the company winning the Hurley Award. In the case of waffle irons and toasters only was the average for the Northwest greater than the Hurley prize winner. The report then discussed nine means by which small appliance sales might be increased, the principal ones being the tying in of a small appliance sale with a major campaign, utilization of inexpensive media in advertising, such as the backs of envelopes and manufacturers' folders as inserts with bills, and by window displays and demonstrations.

In a prolonged discussion of the appliance selling problem, many ideas were brought out. Points on which there was an apparent unanimity of opinion were that a method of servicing that would keep the appliances in service was important, that education in the use of appliances after they were sold was essential, that adequate wiring had a bearing on the number of appliances a family could use, that only high-grade merchandise should be sold, and that the adequacy of the dealers' efforts in the various communities should be taken into consideration in determining what appliances should be sold and how hard their sale should be pushed.

In the absence of H. M. Ferguson, assistant commercial manager, Utah Power & Light Company, Salt Lake City, chairman, refrigeration committee, no regular report of that committee was presented, but J. L. White, merchandise sales manager, Portland Electric Power Company, chairman, merchandising bureau, stated that the report would attempt to present pros and cons on the subject, "Should the Utility Companies Actively Merchandise Refrigerators?" In a general discussion of promotion policies, J. B. Buman, appliance sales manager, Northwestern Electric Company, told of the co-operative advertising campaign conducted in Portland last year, which has been fully described in the Oct. 1 issue of Electrical West, p. 212. No agreement was reached as to whether or not the companies should continue selling refrigerators, though all recognized an obligation on the part of the companies to continue to assist in their promotion.

It was announced that Lewis A. Lewis, sales manager, The Washington Water Power Company, had accepted appointment as vice-chairman of the Commercial Section to succeed to the chairmanship the coming year, beginning July 1.

## Program of Engineering Section Meeting Is Outlined

Following is the program of the fifth annual general meeting of the Engineering Section, Northwest Electric Light & Power Association, Spokane, March 8-9:

**March 8, morning session.**
Welcome—M. W. Birkett, Washington Water Power Company.
Response—A. C. McMicken, Portland Electric Power Company.

**Committee on Co-operation With Regulatory Bodies.**
Address—Lee Dennis, Railway Commission of Montana.

**Overhead Systems Committee.**
Report on Loading and Strength of Overhead Lines—H. H. Schoolfield, Pacific Power & Light Company.
Equipment and Efficiency of Overhead Line Construction—D. A. Hord, Northwestern Electric Company.
Overhead Network—M. T. Crawford, Puget Sound Power & Light Company.
High-Voltage Insulation and Lighting—Professor H. V. Carpenter, Washington State College.

**Afternoon session.**
Address—Major H. S. Bennion, N.E.L.A.

**Meter Committee.**
Recent Meter Developments—A. H. Kruel, Portland Electric Power Company.
Thermotiles Used on Distribution Circuits—R. M. Freeman, Pacific Power & Light Company.

**Hydraulic Power Committee.**
Chelan Project (illustrated)—V. H. Greisser, Washington Water Power Company.
Wahlman Gathering Tube Intake—W. A. Hill, Washington Water Power Company.

**March 9, morning session.**
Address—E. C. Stone, chairman, Engineering National Section.

**Accident Prevention Committee.**
Three Hazards—G. I. Drennan, Pacific Power & Light Company.
Responsibility of Employer to Lineman—C. F. Young, Portland Electric Power Company.

**Apparatus Committee.**
Lightning Arrester Practice in the Northwest—R. McKay, Washington Water Power Company.
Metal Tank Mercury Rectifier Sets—John Bankus, Portland Electric Power Company.

**Afternoon session.**

**Underground Systems Committee.**
Series of topics presented by sponsor in five minutes and thrown open for discussion.
Use of Duplex or Concentric Cable for Edison Feeders and Mains, and Single or Multi Conductor Cable for a.c. or d.c. Services—F. L. Rohrbach, Washington Water Power Company.
Migration of Cable Compound—C. H. Hoge, Puget Sound Power & Light Company.
Underground Cable Accessories—J. M. Gillham, Portland Electric Power Company.
The Ohm Bug in Open-Air Terminals—S. B. Clark, Northwestern Electric Company.
Locating Faults on Transmission and Distribution Cables—John S. Volpe, Portland Electric Power Company.
Wood-Pulp Paper vs. Manila Paper for Cable Insulation on Intermediate Voltages—E. F. Pearson, Northwestern Electric Company.

**Inductive Co-ordination Committee.**
Radio Interference From Power Circuits—Ellis VanAtta, Pacific Power & Light Company.

**Prime Movers Committee.**
Feed Water Treatment and Filtration (illustrated)—H. S. Bastian, C. C. Moore & Company Engineers.
Analysis of Serial Reports of National Prime Movers Subcommittee—Walter Brenton, Portland Electric Power Company.

**Accounting Section to Meet in Portland**—The midwinter meeting of the Accounting Section, Northwest Electric Light and Power Association, will be held in the Public Service Building, Portland, on March 12, according to announcement of the chairman, F. W. Brownell, comptroller, Puget Sound Power & Light Company, Seattle. Besides conference discussion of committee reports there will be presented a suggested program of broadened activity for the section, and two live topics of the day.

## Contractors, Dealers and Inspectors

# N. E. Code Revision Problems Studied by Northwest Inspectors' Convention

CONTINUING its deliberations on Friday and Saturday, Jan. 27 and 28, at Seattle (the first day's events having been reported in the last issue), the third annual convention of the Northwest Association of Electrical Inspectors concerned itself with listening to outstanding speakers and with hearing and discussing committee reports. Among the former, H. B. Kirkland, Society for Electrical Development, New York, discussed the uniform electrical ordinance; John A. Laing, vice-president, Pacific Power & Light Company, Portland, touched on inspection from the standpoint of operating companies; a cure for the fuse abuse problem was suggested by L. W. Going, chief electrical inspector, Portland, while his associate in the Portland electrical inspection department, J. C. Caine, made a plea for municipal control of electrical equipment; F. W. Carlson, Seattle, manager of the Crouse-Hinds Company, read a paper on grounding by S. W. Borden, grounding engineer of that company; and C. W. Charlton, engineer, Electrical Products Corporation, Seattle, gave a technical description of Neon signs.

Committee reports brought out a number of points on which the Northwest association desired to make recommendations to the electrical committee of the N.F.P.A. covering revision of the National Electrical Code.

Explaining that his position in the newly organized Society for Electrical Development was at the head of the department on codes, ordinances and statutes, H. B. Kirkland made a plea for a more universal adoption of the "Uniform Electrical Ordinance." He showed how the society had been able to assist municipalities in passing this ordinance which is designed to standardize electrical equipment as far as possible through making the National Code the standard of electrical work. The first step in this is to form the sectional inspectors' associations into an international organization so that the thinking of each section may be readily transmitted to all the other sections and eventually co-ordinated. He commended the Underwriters' Laboratories, Inc., and voiced approval of Portland's system of regulating equipment and appliances by prohibiting the sale of non-approved devices.

"The operating companies may not be responsible legally for what happens on the customer's premises but they feel a definite moral responsibility in seeing that safe use is made of the electrical service they sell," said John A. Laing, in discussing inspection from the utility company's standpoint. He emphasized the value to the industry of the "Uniform Ordinance," and suggested that the N.E.C. and N.S.C. might well be included in one code, covering both fire and life hazard in one rule. Reinspection to disclose unsafe wiring added to wiring that was originally safe, would be a means of reducing electrical fires, he declared. In this connection he contended that publicity given to electrical fires would not shake the people's belief in the usefulness of electricity, but would arouse the public consciousness to an understanding of the necessity for having safe wiring.

In a paper offering a basis for solution of the fuse abuse problem, L. W. Going stated that the code, instead of trying to restrict the habits of the public in the use of appliances, by specifying adequate current-carrying capacity in house circuits and feeders should remove the cause for changing fuse sizes and otherwise tampering with them. "We must re-design our present inadequate wiring layouts to meet the demands of the consumer rather than attempt to restrict his demands and needs to limits imposed by inadequately designed installations," he said. He discussed the three principal causes of fuse tampering, fixed loads in excess of 15 amp., short circuits in cords, and use of movable appliances on circuits of fixed loads, and showed that the remedy lay in suitable code treatment specifying minimum wattage for given areas with respect to occupancy, or prescribing directly the number of circuits necessary to cover a given area.

*California Inspectors at Santa Barbara*

Annual convention of **California Association of Electrical Inspectors**, Hotel Carrillo, Santa Barbara, March 22, 23 and 24. Detailed program to be announced later. For information communicate with Harry Beecher, chief electrical inspector, Los Angeles, president of the association, or C. W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, secretary.

The paper on "Grounding" by S. W. Borden, Crouse-Hinds Company, read in Mr. Borden's absence by F. W. Carlson, defined and described safety circuits, and illustrated by sketches the proper method of installing them. This subject by Mr. Borden was treated at length in Electrical West, Jan. 1, page 35. Following the presentation of the paper, E. G. S. Pryor, resident engineer, Underwriters' Laboratories, Inc., Seattle, presented the report of the Grounding Committee of the Northwest Association, in which progress only without definite recommendation was reported. Discussion brought out the contention that grounds to the water system in a building should be made at the closest point possible to the point of entry of the water service to the building to eliminate whatever high resistance joints might exist in the water system within the building.

J. C. Caine, in a paper answering the question, "Is the Public Benefited by Municipal Control of Sale of Electrical Equipment?" told of instances of electrocution and fire caused by non-approved equipment finding its way into Portland installations.

In one instance a repairman was killed while working on a non-approved bake oven that had been installed in Portland before the control ordinance was put into effect. In another a woman was killed by contact with a non-approved heater cord that had been attached to a washing machine by a repairman who did not recognize the danger of using such cord under conditions of extreme dampness. In a third a radiant gas sign of non-approved type using an inferior high tension cable caused a fire in less than twelve hours' operation and before the inspector had had time to condemn the job. The conclusion was that through the operation of such a control as is exercised by the Portland code, which tends to keep materials and equipment which have not been approved by Underwriters' Laboratories out of the electrical installations in that city, a great benefit is derived by the public which relies on the inspection department for advice as to the utilization of electricity.

A complete explanation of the natural and electrical phenomena involved in the operation of neon signs, with a description of the equipment used in their manufacture, was given by C. W. Charlton, engineer, Electrical Products Corporation, Seattle.

Particular stress was laid on the safety features of the equipment, which consist primarily in the current-limiting characteristics inherent in the transformer, which keeps the short circuit current down to about 23 milliamperes, no greater than ordinary operating current, and the use of high voltage cable capable of operating at 300 per cent normal voltage, which is 12,000. In the discussion, questions as to the installation and operation of the signs indicated a great interest in the subject by inspectors and contractors.

Among committee reports bringing recommendations for code revision before the convention for aproval and transmission as recommendation of the Northwest association to the electrical committee of the N.F.P.A., was the report of the code clearing house committee presented by L. W. Going. This report was published in full in the February issue of Electrical West. On discussion of some of its provisions it was passed after striking out that part pertaining to the use of bare wire neutral in grounded circuits.

Reporting for the range diversity committee, R. E. Thatcher, superintendent of service, central district, Puget Sound Power & Light Company, Seattle, stated:

That his committee had forwarded demand curves on multi-range installations in apartment houses to technical subcommittee No. 16 of the electrical committee, but that this subcommittee had not thought it possessed sufficient data on which to base a recommendation to the larger national body. Attention was called to a table of demand factors submitted by the city electrician of Winnipeg on from three

to twenty-five ranges, showing factors of from 100 per cent to 40 per cent on small ranges and from 95 per cent to 30 per cent on larger ones. Discussion favored the inclusion of only one table, and that applying to the larger ranges because the size of range frequently is not determined until after the wiring is completed, and because the diversity of the larger ranges is greater. On further discussion on sizes of services and mains, Mr. Thatcher advanced the opinion that inspectors and power company representatives should advise the user to install adequate sized wire from a service standpoint even though a smaller size might be suitable from a safety standpoint.

I. B. Sturges, deputy electrical inspector, Portland, reporting for the committee on radio installation, recommended minor changes in Article 37 of the N.E.C. pertaining to building contacts for aerials, and suggested the use of approved devices for securing spans and insulators to buildings. The committee also recommended fusing all positive leads of the "B" plate storage battery in lieu of the single fuse on the negative lead.

The Article 8 committee, as reported by W. E. Roberts, deputy electrical inspector, Portland, recommended a number of changes in the N.E.C., among which the following were of most importance: that either increased area of fuse terminals or increased tension on present terminals be required; that fuses should be of approved enclosed type; that carrying capacities of conductors be raised from 110 per cent to 125 per cent of the name plate current rating of motors; with further recommendations as to fusing control circuits and motor circuits where a demand factor is permitted, looking to a reduction of wiring expense in such installations.

C. W. Lynch, Seattle fire department, chairman of the fire alarm committee, reported that progress had been made on a very complete study of auxilliary fire alarm systems in hotels and public buildings, but that since the study had not been completed the committee desired to be continued to report later.

The legislative committee for Oregon and Washington both reported lack of success in getting the legislation suggested at the last convention passed in their respective states. F. H. Murphy, illuminating engineer, Portland Electric Power Company, Portland, reporting for the Oregon committee, stated that the proposed act to combine all state electrical inspection under one department had met with conflicting political interests impossible to reconcile. The new code for Washington met a like fate when it was found that not all interested groups were in entire agreement as to what it should contain, according to H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle.

Resolutions passed included:

One commending the electrical committee on its work during the past year and approving in principle its suggested recommendations for code revision; one urging the early appointment of a successor to W. J. Canada, who has resigned as electrical field secretary of the N.F.P.A.; and one giving recognition to the Electric Club of Seattle and other organizations and individuals contributing to the success of the convention. A resolution suggesting that the name "Electrical Safety Supervisor" more nearly expressed "the true position of the electrical inspector in the industry and in his relation to the public" and would remove the "unfavorable psychological effect" of the title "Inspector," was referred to the executive committee for further consideration.

Amendments to the constitution passed by the membership:

Raised the annual dues one dollar; made is possible to vote by mail on matters of importance arising between conventions; and changed the time of year of annual conventions to some time between Aug. 1 and Oct. 1. For the next convention, to be held in the fall of 1929, the invitation of Vancouver, B. C., was unanimously accepted after the gracious withdrawal of Tacoma and Bellingham from the contest.

Under the "Question Box" order of business, two questions precipitated warm debate, namely, will this convention go on record favoring legislation that all electrical contractors pass examination on their qualifications before a license is granted? And, in the event that legislation cannot be passed, should a permit be granted to an owner not competent to put in work acocrding to regulations? No action was taken.

Officers elected for the coming year were:

President—H. A. Patton; vice-president—T. W. Carlon, electrical inspector and fire chief, Bend, Ore., re-elected; and secretary-treasurer—F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland, re-elected. The following were retained on the executive committee: J. B. Fisken, consulting engineer, The Washington Water Power Company, Spokane; T. S. Wood, Packard Electric Company, Seattle; H. S. Jenkins, chief electrical inspector, Bellingham, Wash.; and P. H. Sroufe, Jaggar-Sroufe, contractors, Portland. W. A. Groce, assistant fire marshal, State of Washington, Olympia, was elected to succeed A. Nicholson, chief electrical inspector, Seattle.

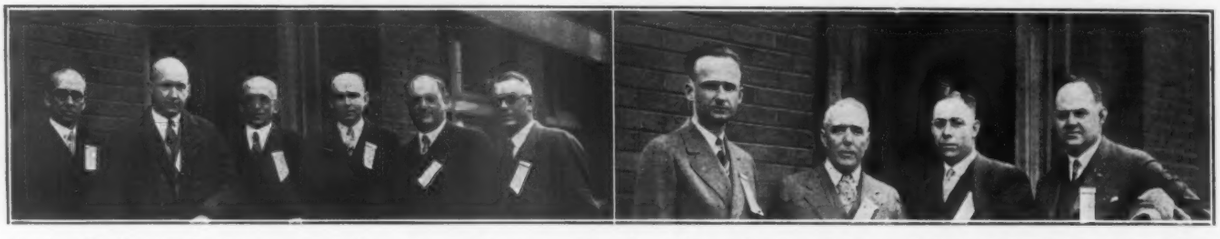
A gratifying increase over last year in the number and excellence of manufacturers' exhibits was a feature contributing to the value of the convention to the delegates, as were three interesting inspection trips conducted by the A. G. Manufacturing Company, the Electric Products Corporation and the Metropolitan Electric Company, all of Seattle.

The banquet, tendered Friday night by the Electric Club of Seattle, and attended by many of that organization as well as by the convention delegates, was the principal entertainment features. The speaker of the evening was W. D. Shannon, general superintendent, Stone & Webster, Inc., Seattle, who interestingly sketched the history of electrical development in Seattle and vicinity.

### *Sacramento for Northern—Santa Barbara Southern Division Meetings of Electragists*

**Northern Division** meeting, California Electragists, Saturday, March 10, at Hotel Senator, Sacramento. Steamer Navajo leaves San Francisco Friday, 6 p.m. Returns from Sacramento 6 p.m. Saturday. Special rate of $12 covers all costs. Morning session open to all branches of the industry. Afternoon for association problems. Reservations 522 Call Building, San Francisco. **Southern Division** meeting, Hotel Carrillo, Santa Barbara. Friday and Saturday, March 16 and 17. First session Saturday morning. Make reservations with Southern Division office, 610 Cotton Exchange Building, Los Angeles.

**New Sacramento Ordinance**—A new electrical ordinance, based upon the uniform electrical ordinance proposed by the California Association of Electrical Inspectors, was adopted recently by the City of Sacramento and became effective Dec. 25. Some of the features of the local requirements are an increase of license from $30 to $50 a year with reductions in the cost of inspection; supervising electricians are required to pass an examination and must have not less than four years' practical experience; journeymen are required to register and secure a license.



At the Northwest Inspectors' convention among those present were (in the left hand picture): L. W. Going, chief electrical inspector, Portland; J. A. Laing vice-president, Pacific Power & Light Company, Portland; L. A. Barley, chief engineer, Mountain States Inspection Bureau, Denver; H. S. Jenkins, chief electrical inspector, Bellingham, Wash., retiring president; F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland, re-elected secretary; and H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle, the newly elected president. In the picture at the right, left to right, are: C. R. Welborn, superintendent label service, Underwriters Laboratories, Chicago; T. W. Carlon, electrical inspector and fire chief, Bend, Ore., re-elected vice-president; William Myers, Bureau of Labor, Salem, Ore.; and W. A. Grace, assistant fire marshall, State of Washington, Olympia, elected to the executive committee. Other pictures takes at the convention will appear in later issues of Electrical West.

# Motor Distribution Subjected to Inquiry at Fresno State Motor Section Meeting

COMPETENCY to best serve the interests of public and manufacturer alike was made the basis of suggested improvements to the motor distribution policies of manufacturers by the State Motor Section, California Electragists, at its first meeting, held at Fresno, Feb. 10 and 11. Called together to co-ordinate the work which has been started by motor sections both in San Francisco and Los Angeles, the newly formed state organization of motor dealers and motor specialists laid its case before representatives of motor manufacturers and asked them to submit its suggestions to headquarters with whatever recommendations they cared to make after a frank and open discussion of the entire problem on the floor of the meeting.

The first day of the two-day convention was spent in closed session while motor dealers thrashed out the issues which they wished placed before motor manufacturers. After the election of H. D. Adams, Farnsworth Electric Company, San Francisco, as president; Frank Broiles, International Electric & Machinery Company, Los Angeles, as vice-president, and E. E. Elzea, Electric Motor Shop, Fresno, as secretary, papers were read by N. Nelson, Enterprise Electric Works, San Francisco; L. H. Ellett, Los Angeles Electric Works; and F. Sievers, Coney & Kuchel, San Francisco, discussion was opened and a committee named to prepare a brief to present to the motor manufacturers.

The trade policy and editing committees charged with the preparation of the brief were composed of the following:

**Trade Policy Committee:** F. Sievers, K. M. Noble, Buzzell Electric Works, San Francisco; Walter Vance, Pacific Electric Motor Company, Oakland; Frank Broiles, and L. H. Ellett. **Editing Committee:** N. Nelson, E. E. Elzea, J. B. Morgan, Morgan Electric Company, Pasadena; Lloyd Flatland, Globe Electric Company, San Francisco; and T. L. Rosenberg, Oakland.

The salient features of the Motor Section paper may be gained from the following excerpts, condensed from the paper:

The motor dealer feels that his claim to consideration must be determined, in the final analysis, upon a basis of competency to serve. No other basis is economic and therefore no effort has been made herein to analyze the situation on any other grounds.

It will be agreed without controversy that the motor and motor accessory manufacturers desire:

1. The greatest possible development of the market for their products.
2. Outlets which possess: (*a*) character, (*b*) credit standing, (*c*) business and technical capacity fitting them satisfactorily to: (*a*) sell, (*b*) install and (*c*) service such equipment.
3. Protection of their policies and products and the good name of their individual institutions.

(The retirement of obsolete and inefficient equipment bearing the name plate guarantee of that manufacturer in favor of modern new equipment is something which can be hastened by the motor dealer for the manufacturer.)

4. Loyalty to their products and to the furthering of those products upon the market, and
5. Adequate and satisfactory dealer representation.

The fact that under present conditions of motor distribution the motor dealer cannot make sufficient profit to survive has killed interest in the development of the market on the part of the dealer. No other reaction can be expected under conditions which violate the one fundamental principle of business development, **the incentive to legitimate profit.**

From the evidence the following causes are shown to lie at the bottom of the general breakdown of the present motor market:

1. Too great a number of motor sales outlets.
2. Indiscriminate direct sale of motors and equipment to *users* by manufacturers at discounts from published resale prices.
3. Vague and elastic buyers classifications.
4. Disregard of published and established resale list prices by the manufacturers' representatives.
5. Destruction of the morale of motor dealers because of a type of campetition which forces the dealer to make corresponding discounts or lose the business, eliminating his own profits and often causing financial loss to him, which reacts to the detriment of the motor market.

The most serious of these conditions, as brought into focus by an investigation of the situation completed by the Motor Section, are "the vague and elastic buyers' classifications" and "the disregard by manufacturers of the published and established resale list prices."

The chief source of annoyance is the 10 per cent discount to listed consumers. This classification is so vague that many of the motor manufacturers, even some motor dealers themselves, use it as a means to "slip one over" and get the business with the result that whenever a large buyer is in the market for some motors everybody is nervously watching and fearing what the other man might do, instead of trying to sell the products on their merits. It is true that the number of this class of customers has been reduced in the past year or two, but there is still much to be done to clear up a very bad condition.

Competency to serve the motor manufacturers at the highest efficiency and the extension of the motor market at the most consistent pace is dependent upon the effort put forth by the dealer. His interest in the development of the market is essential. No less essential is the careful selection of the motor outlet by the manufacturer. In both cases there rests upon the manufacturers a responsibility which cannot be ignored if the market is to be stabilized and the proper energy devoted to the extension of the market.

It is only consistent with good faith in presenting an analysis of injurious and unhealthy conditions to seek and propose a sound and well considered method of cure. There are many problems of individual technique, management, salesmanship, and internal policy, contributary to an improved market development, which the motor section plans to undertake for the good of its own members. These problems are being intelligently studied in section meetings.

There devolves upon the manufacturers the necessity for immediate action in respect to several factors determining the future stability of the market.

The Motor Section of the California Electragists, therefore, submits to the manufacturers of motors and motor equipment, the following recommendations for distinct improvement of policy and subsequent improvement of the market which the renewed efforts of motor dealers will bring.

1. Scientific elimination of dealer outlets gradually and over a sufficient period of time so as not to cause hardship, by means of more rigid requirements as to:
   (*a*) Character of dealer outlets.
   (*b*) Credit responsibility.
   (*c*) Capacity to sell, install and service.
2. Elimination of discounts to users.
3. Building up the dealers' capacity to serve and enlarge the market by means of:
   (*a*) Sales training and helps.
   (*b*) Protection of contract holders, and
   (*c*) Co-operation with dealer outlets.
4. Penalties for infraction of contract, consisting of unethical and unauthorized practices on the part of contract holders, even to the extent of withdrawal of contract privileges for those not living up to contract requirements.

The motor dealers make certain recommendations it is true, but in making them they accept certain responsibilities no less rigorous than those which they ask of the manufacturers.

The Motor Section is presenting issues it presented a year ago. Something has been started but very little accomplished. The longer the real issues are side-stepped the longer will this motor business slump along far below its potential level.

### Manufacturers Reply

In response to the motor dealers' statement of their case representatives of motor manufacturers declared variously that:

Some motor dealers were as mercenary as manufacturers; that motor policy could only be changed by head offices; that the personal factor was very important; that dealers must co-operate more fully and must be willing to win or lose with the manufacturer they represent; that they must demonstrate their sincerity and prove competency; that they must guarantee not to give away present discounts before asking for greater discounts; and most of all that more aggressive sales methods must be developed by the dealers.

To each of these contentions answers were made and discussion of the factors involved continued until adjournment Saturday afternoon. There was a general feeling at the end of the meeting —substantiated by pledges of support from manufacturers' representatives that they would see to it that home offices were given a full report of the meeting and its recommendations; that a common meeting ground for the disection of mutual problems had been established and that policies and interpretations of them would be improved as a result.

Another meeting of the group has been set for October during the state Electragist convention.

# Personals

## Industrial Outlook Discussed by R. M. Davis in the West

**R. M. Davis,** statistical editor, McGraw-Hill Publishing Company, Inc., New York City, recently made a trip through the West and Southwest where

ROBERT M. DAVIS

he discussed "The Industrial Outlook for 1928" before numerous business organizations and the commercial departments of various state universities. In his discussion Mr. Davis referred to the fact that 1928 is a presidential election year and that usually such a year is viewed by business men with apprehension. However, he stated that extensive studies that he had made indicate that there is no warrant for the continued survival of this feeling and that present and past economic developments forecast continuance of the present general prosperity during 1928. While in the West Mr. Davis spoke in Denver, Spokane, Seattle, Portland, San Francisco and Los Angeles.

Mr. Davis has been statistical editor for the McGraw-Hill Publishing Company for the past two years. For seven years prior to that he was statistical editor of Electrical World. For eleven years he was hydraulic engineer with the U. S. Engineer Office and Geological Survey, and during the war was captain of engineers and served a year in France.

---

**Kinsey M. Robinson,** engineer for the Payette division of the Idaho Power Company, has been appointed manager of that division, succeeding **J. D. Orr,** transferred to the Twin Falls division. Mr. Robinson was born at Mankato, Minn., and went to Idaho in 1904. He became associated with the Idaho-Oregon Light & Power Company in June, 1911, continuing with the Idaho Power Company, its successor, as local agent at Parma, Idaho, until, in 1921, he was made division engineer at Payette.

**J. W. White** has been elected a director and managing director of the Westinghouse Electric Company of Japan. Mr. White has had a wide experience with the Westinghouse company, both in the United States and abroad, having been, respectively, general manager of the Japan company, manager of the power section of the Detroit office, and manager of the Westinghouse International Company of Cuba. He succeeds **I. F. Baker,** who has been made manager of the Far Eastern Department of the latter company.

**Howard Butler,** connected with the Phoenix Utility Company, doing the construction work at American Falls and Shoshone Falls for the Idaho Power Company, has been transferred to that company's engineering department at Boise.

**A. N. Cudworth,** formerly assistant secretary and assistant treasurer, The Northwestern Electric Company, Portland, is now connected with the auditing department of the Electric Bond & Share Company and at present is in Brazil.

**Thomas A. Edison** celebrated his 81st birthday on Feb. 11 at his winter home in Fort Myers, Fla. At a community festival produced in his honor by 4,000 school children, Mr. Edison cut a large birthday cake lighted with 81 electric candles and distributed the pieces among the children and friends.

**George F. Oxley,** director of the department of public information, N.E.L.A., accompanied by **T. A. Kenney,** of Hodenpyl, Hardy & Company, Inc., New York, chairman of the information bureau organizations committee, Public Relations National Section, recently visited the Pacific Coast. They spent the major part of the time in Portland and San Francisco.

**C. W. Rolph,** street lighting engineer of the Holophane Company, Inc., New York, recently paid a visit to San Francisco. While there he spoke before a meeting of the Illuminating Engineering Society, San Francisco Bay Cities Chapter.

**Dr. Matthew Luckiesh,** director of research, General Electric Laboratories, Nela Park, Cleveland, and past-president of the National Illuminating Engineering Society, spoke on "Artificial Light and Civilization" before the Los Angeles Electric Club while on a visit to that city.

**Herbert E. Metcalf,** formerly chief engineer, The Magnavox Company, Oakland, Calif., has resigned his position with that firm to become president and chief engineer of the Wonderlite Company of America, Inc., with headquarters in San Francisco.

**W. H. Somers,** traffic manager, Puget Sound Power & Light Company, has been named president of the Travelers Aid Society in Seattle.

**Arthur Miller,** president, The Miller Company, Meriden, Conn., not long ago spent some time on the Pacific Coast, the greater part of it in Los Angeles and San Francisco.

## Electrical Veteran Chosen as President by League

**Arthur H. Halloran,** editor of Radio and of Broadcast Weekly, has been elected president of the San Francisco Electrical Development League, succeeding **A. H. Nicoll,** sales manager of the Graybar Electric Company at San Francisco.

Mr. Halloran has been actively identified with the electrical industry of San Francisco since 1907, when he became managing editor of the Journal

ARTHUR H. HALLORAN

of Electricity, a position which he held continuously for twelve years. He was prominently identified with the old Jovian Order and was instrumental in merging the local Jovian Club with the Electrical Development League in 1913.

Because of his interest in the work of the National Electric Light Association he was elected secretary of the Pacific Coast Section when it was formed in 1917, combining these duties with his editorial work for nearly three years. During that period he was also Western representative of The Society for Electrical Development. After the Journal of Electricity was purchased by the McGraw-Hill Company in 1919 he became Pacific Coast manager of the McGraw-Hill Book Company, resigning in 1921 to become president and editor of Pacific Radio News, whose name he changed to Radio.

Sensing the need for organization in the radio industry he formed the Pacific Radio Trade Association, acting as its president in 1921 and 1926 and serving on its board of directors in the interim. He has been a member of all the conferences on radio matters held in Washington, D. C., at the call of Secretary Hoover.

Mr. Halloran has been an active electrical experimenter and the author of many technical articles as well as an editorial writer for nearly 30 years. He is a charter member of the Engineers Club of San Francisco, past-president of the Kiwanis Club, and a member of the Institute of Radio Engineers. During the Panama Pacific International Exposition he served as a member of the electrical jury of awards.

## R. M. Bleak Is President of Utah Electrical League

**Ralph M. Bleak,** who has been elected president of the Electrical League of Utah, has been identified with the electrical industry for the past thirteen years. He is superintendent of lighting and appliance sales of the Utah Power & Light Company, Salt Lake City, a position which he has reached as a result of a thorough training in the sales department of that institution. Practically all of his experience in the electrical field has been acquired since he first entered the employ of the Utah Power & Light Company as a clerk in its sales department, early in 1915.

RALPH M. BLEAK

Mr. Bleak has been very active also in the development of the work of the Electrical League of Utah and its predecessor, the Rocky Mountain Electrical Co-operative League, ever since it came into existence. He has held the office of secretary and treasurer for several years and during the past year served as vice-president.

---

**Captain N. Rob Bjuke,** Royal Swedish Corps of Engineers, executive engineer, Board of Conservancy, Works of Kwangtung, Canton, China, visited San Francisco in February in the course of a trip of investigation of hydro-electric power development, flood control and irrigation works in the United States.

**Arthur R. Kelley,** consulting engineer, has removed his office from 1102 Nevada Bank Building, San Francisco, to 605 Fay Building, Los Angeles.

**E. Bate,** chief electrical engineer, State Electricity Commission, Victoria, Australia, recently spent some time in San Francisco during a tour of inspection of power companies and plants in the United States. Following his departure from this country he will make a similar tour of inspection in Europe.

**Charles R. Musladin,** connected with George Campe Company, Inc., San Francisco, has been spending a month in the East.

**P. C. Brooks,** president of E. & T. Fairbanks & Company and vice-president of the Canadian Fairbanks-Morse Company, Ltd., has been made a vice-president of Fairbanks, Morse & Company, Chicago.

**J. L. Beebe,** Northwestern representative of the Trumbull Electric Manufacturing Company with headquarters in Seattle, recently returned from a sales conference held at the factory in Plainville, Conn. While there he enjoyed his first airplane ride as the guest of Governor Trumbull, president of the company.

**W. E. Melarkey,** formerly automatic and switchboard specialist for the General Electric Company in San Francisco, has been transferred to Stockton as that company's sales representative in the San Joaquin Valley.

**M. H. Dillon** has been transferred from the Graybar Electric Company's Kansas City branch to Denver to succeed the late **A. L. Stadler.**

**F. L. Tainter,** San Francisco district advertising manager, Westinghouse Electric & Manufacturing Company, has returned from a trip to the Westinghouse factories at East Pittsburgh, Pa., and Mansfield, Ohio. While in East Pittsburgh he attended a meeting held for the purpose of discussing advertising plans of the company for the coming fiscal year.

**Ralph W. Carpenter,** for the past thirteen years local manager of the Idaho Power Company at Nampa and at Emmett, Idaho, has been appointed manager of its newly created Jerome Division with headquarters at Jerome. Mr. Carpenter was born in Omaha and received his education in Nebraska. For a number of years, before entering the utility field, he was engaged in the contracting side of the electrical industry in Boise, Idaho. He has taken an active part in civic affairs, while in Nampa, as a member of the Nampa School Board, director of the Kiwanis Club, member of the local Chamber of Commerce, and a number of other civic organizations.

**J. B. Black,** vice-president, the Western Power Corporation, New York, which controls the Great Western Power Company of California and the San Joaquin Light & Power Corporation, Fresno, during February paid a visit to both those cities. Mr. Black was formerly vice-president and general manager of the Great Western Power Company with headquarters in San Francisco. **Edwin Gruhl,** vice-president and general manager, North American Company, New York, holding company for the Western Power Corporation, accompanied Mr. Black.

**R. H. Ballard,** vice-president and general manager, Southern California Edison Company, Los Angeles, and chairman of the Public Policy Committee, N.E.L.A., recently returned from New York where he attended a meeting of that committee.

**Clare N. Stannard,** vice-president and general manager, Public Service Company of Colorado, Denver, left that city a short while ago en route to Honolulu.

**W. L. Newmeyer,** since 1924 connected with the Westinghouse Electric Company of Japan, has been chosen to represent the Westinghouse company in China.

## Denver Man Becomes Assistant General Superintendent

**F. F. McCammon,** since 1920, manager of power sales, Public Service Company of Colorado, Denver, has been appointed assistant general superintendent of the company. Mr. McCammon first entered the employ of the Denver Gas & Electric Light Company, a predecessor of the Public Service Company, as a junior engineer following his graduation from Colorado College in 1916. He entered the student training course of the company and continued with it until the outbreak of the war. Then he enlisted and served as ensign in the engineering division of the Navy. Upon his return to Denver in July, 1919, he became general engineer for the Denver Gas & Electric Light Company, a position which he held until he was appointed power sales manager.

F. F. McCAMMON

Mr. McCammon has been active in the affairs of the Electrical League of Colorado, has served on its advisory board for several years and during 1927 was its chairman. He is a member of both the N.E.L.A. and the A.I.E.E.

# Obituary

**Samuel J. Keese,** pioneer in the electrical field in Los Angeles, died in that city in January. Arriving in California in 1887, Mr. Keese first lived in Pasadena where he was employed by the General Electric Company. He built and exhibited one of the first arc lights used in Pasadena and also installed the lighting plant of the Mount Lowe Railway. In 1900 he removed to Los Angeles as a member of the company of Rhodes & Keese, which for several years was the only electrical supply house in the city. Mr. Keese, at the time of his death, was president of the Southern California Academy of Science.

# Meetings

## *Coming Events*

**American Institute of Electrical Engineers**—Pacific Coast convention at Davenport Hotel, Spokane, Aug. 28-31, 1928.

**Arizona Utilities Association**—Joint convention with Pacific Coast Electrical Association and Pacific Coast Gas Association in Prescott, Ariz., April 26-28, 1928.

**California Electragists**—Meeting of Northern Division at Sacramento, March 9-10, 1928.

**California Electrical Inspectors**—Annual convention at Santa Barbara, March 22-24, 1928.

**Northwest Electric Light and Power Association**—Engineering Section—General meeting in Spokane, March 8-9, 1928.

Accounting Section—Midwinter meeting, Public Service Building, Portland, March 12, 1928.

Annual convention in Portland, June 19-22, 1928.

**Pacific Coast Electrical Association.**—

Advertising-Publicity Section—Meeting in Los Angeles, March 9, 1928.

Engineering Section—Group meetings in San Joaquin Building, Fresno, April 4-6, 1928.

Transportation Section—Meeting in San Diego Consolidated Gas & Electric Company Building, San Diego, March 9, 1928.

Annual convention, Huntington Hotel, Pasadena, June 12-15, 1928.

## San Francisco League Announces Official Personnel

At a recent election of the San Francisco Electrical Development League Arthur H. Halloran, president and editor, Pacific Radio Publishing Company, was elected president and Roy N. Phelan, secretary-treasurer, McGraw-Hill Company of California, was re-elected secretary-treasurer.

Directors elected for two years include B. M. Tassie, Pacific Coast manager, Manning-Bowman & Company; Lloyd Flatland, manager Globe Electric Works; and Ernest Ingold, president Ernest Ingold, Inc. The directors who have still another year to serve are Charles R. Musladin, with George Campe, Inc., Don C. Ray, manager Bureau of Public Relations, Pacific Gas and Electric Company; and W. L. Winter, sales engineer, Westinghouse Electric & Manufacturing Company. A. H. Nicoll, retiring president, is an ex-officio member of the board of directors.

## Electric Club Program Features Intelligence Contest

A novel entertainment feature introduced at a recent San Diego Electric Club luncheon meeting was an "Intelligence Contest," with electrical appliances varying from percolator and electric iron to a fishlight as prizes.

A list of the contest questions follows:

1. What is Ohm's law?
2. Who invented the induction motor?
3. What is the highest voltage used for transmission in California today?
4. A radio station broadcasts at a frequency of one million cycles. What is the wave length?
5. A transformer is built for use on a 60-cycle system. Will it run warmer or cooler on a 50-cycle system?
6. An alternating current generator with two pairs of poles runs at 1,500 r.p.m. What is the frequency of the generated current in cycles per second?
7. What is the resistance of three coils connected in parallel, if the resistance of each coil separately is 5, 10 and 20 ohms?
8. If you should happen to be the only person near when a man receives an electric shock which made him unconscious what would you do?
9. What is an auto-transformer?
10. Make a sketch showing how wiring and switches can be so connected that a lamp can be switched on or off from either of two stations.

Ray H. Taber of the San Diego Consolidated Gas & Electric Company won first prize with a score of 100 per cent. Second, third, fourth and consolation prizes were won by H. G. Griest, Pacific Telephone and Telegraph Company; H. G. Dillin and A. S. Glasgow, San Diego Consolidated Gas & Electric Company; and A. G. Bartlett, Pacific Telephone and Telegraph Company.

## Presentation of Service Pins Marks Old Guard Banquet

The sixteenth annual banquet of the Old Guard, composed of members of the organization of the Los Angeles Gas and Electric Corporation who have been in the service of that company ten years or more, was held at the Hotel Biltmore, Los Angeles, Feb. 1. The banquet was well attended and an interesting program was presented. A feature of the evening was the initiation of the Class of 1928.

E. R. Northmore, superintendent of electric distribution, was presented by William Baurhyte, president of the company, with a pin commemorating his 35 years of service. Twenty-five-year pins were presented to five members, 20-year pins to 16, 15-year pins to 28, and 10-year pins to 30 members.

## Utah Electrical League Sponsors Lectures on Lighting

A series of lectures on the subject of lighting recently was presented in Salt Lake City under the auspices of the Lighting Service Bureau in conjunction with the Electrical League of Utah by Clark Baker, lighting expert of the National Lamp Works of the General Electric Company. They were attended by members of the electrical industry, particularly those who are directly interested in the subject of lighting.

**New Officers for Electrical Supply Jobbers, Pacific Division**—At the convention of the Pacific Division, Electrical Supply Jobbers Association, held at Del Monte, D. E. Harris, president, Pacific States Electric Company, San Francisco, was elected chairman, and Harry L. Harper, manager Graybar Electric Company, Los Angeles, was made a member of the executive committee. Albert H. Elliot, San Francisco, was re-elected to the office of secretary.

## Washington C.R.E.A. Adopts Plan for 1928 Activities

Nineteen men actively interested in the work of the Washington committee on the relation of electricity to agriculture attended the recent annual meeting of that body held at the State College of Washington, Pullman, Wash. An extensive report of field and laboratory work done in 1927 was read and a comprehensive plan for the 1928 activities was adopted.

Dr. E. O. Holland, president of Washington State College, faculty members and representatives of The Washington Water Power Company, Puget Sound Power & Light Company, and the Pacific Power & Light Company, attended. The work was outlined by L. J. Smith, secretary, and Harry L. Garver, investigator for the committee.

The progress report for 1927 of Messrs. Smith and Garver outlined in detail the field and laboratory work.

Projects proposed and approved for 1928 are listed under ten headings:

1 Household operations in co-operation with the home economics investigator.
   (a) To install and assist in tests of electrical home equipment in the home economics laboratory; equipment to be used later in the farm home.
   (b) To install and to make time studies of electrical equipment in farm houses, in comparison with homes not having electrical equipment.
   (c) Preparation of reports of home economics investigator's work.
2 Farm shop studies.
   To install line shaft and electric motor in a farm shop on a typical diversified farm in eastern Washington.
   (b) To make power studies of the different repair operations in the farm shop.
   (c) To make power studies of the different repair operations in the college farm shop.
   (d) To tabulate reports preparatory to writing a bulletin.
3 Poultry house heating and ventilation by means of electric fans at the Western Washington Experiment Station and the main experiment station at Pullman.
4 Electric incubation and brooding as compared with oil and coal brooders with reference to comparative efficiency and costs.
5 Supplementary irrigation by pumping from wells for gardens and alfalfa in Douglas County, and summer irrigation on the cranberry bogs.
6 Improvements in dairy sterilization.
7 Rural line studies.
   (a) Line losses; transformers, lines and secondaries.
   (b) Farm load characteristics; power factors, demand factors, load factors and diversity factors.
8 Frost prevention in orchards and on the cranberry bogs by means of sprinkling.
9 Development of 10-hp. community motor and determining its utilities for general farming conditions.
10 Bulletins to be prepared.
   (a) Electric Brooding and Incubation.
   (b) Irrigation West of the Cascades.

Suggestion of a conference of representatives of power companies in charge of rural electrification work was adopted, to be held for ten days or two weeks this year at the state college.

**California League Elects Officers**—New officers elected by the Northern Counties Electrical Development League of California are: president—A. E. Greiner, Corning; vice-president—A. Libhardt, Willows; and secretary-treasurer—A. A. White, Chico. The following are members of the board of directors: A. D. Woods, Redding; D. M. Bird, Chico; H. R. Henkins, Corning; and H. A. Lee, Red Bluff.

# Manufacturer & Distributor

## Fifty-five Prizes Offered in Window Display Contest

A window display contest in which 55 prizes will be distributed has been announced by the **Electric Vacuum Cleaner Company, Inc.**, 1734 Ivanhoe Road, Cleveland. There will be three classes of contestants, central stations, department stores, and approved dealers in the United States and Canada, with one grand prize, a Chevrolet coach, for all classes. In each class the cash prizes will be, first, $100; second, $75; third, $50. Honorable mention with a cash prize of $10 will be accorded to 20 contestants, and honorable mention with a cash prize of $5 will be accorded to 25 others in addition.

All entrants must be registered with the company at Cleveland before March 20, 1928. Only those who stock the Premier Family, which consists of the Premier Duplex cleaner, Premier Junior and Premier Pic-Up, floor polisher and hair dryer, prior to the first announcement of the contest are eligible to compete. Each contestant will agree to install a complete Premier Family window display for a period of seven consecutive days between March 26 and April 7 and to devote one entire window to the display. Photographs of the competing windows must be sent to the company prior to April 25.

**Sundh Electric Company, Inc.**, Newark, N. J., recently has appointed Joy & Cox, Tramway Building, Denver, its representatives for the states of Colorado and Wyoming. The Sundh company is represented by Oliver B. Lyman in San Francisco; the Demmert Company in Los Angeles, and T. S. Wood in Seattle.

**The Okonite Company** of Passaic, N. J., has purchased the insulated wire department of the Hazard Manufacturing Company at Wilkes-Barre, Pa., which will be operated as the Hazard Insulated Wire Works, a division of the Okonite Company. The latter has offices in San Francisco, Los Angeles and Seattle.

**The A. G. Manufacturing Company**, with headquarters and factory in Seattle, recently established another factory in Los Angeles at 49th and Loma Vista Sts. J. R. Barry is sales manager and H. B. Griswold business manager.

**Sentinel Manufacturing Company**, 5100 Superior Ave., Cleveland, has purchased and now is manufacturing the Laun-Dry-Ette electric washing machine.

**Leeds & Northrup Company**, 4901 Stenton Ave., Philadelphia, has opened a San Francisco office at 502-4 Rialto Bldg., 116 New Montgomery St., to handle matters pertaining to the general division sales, including central stations, research and industrial laboratories, educational institutions and miscellaneous industries. L. E. Emerich is in charge.

**C. E. Ingalls**, Rialto Building, San Francisco, who represents the Copperweld Steel Company, Rankin, Pa., the Electric Power Equipment Corporation, Philadelphia, and the Industrial Controller Company, Milwaukee, has opened an office in the Citizens National Bank Building, 453 South Spring St., Los Angeles. Fred J. McMullen, formerly a member of the San Francisco staff, will be in charge of the Los Angeles office.

**The Wonderlite Company of America, Inc.**, recently organized to market luminous tube signs in a variety of colors, has opened offices at 15 Stockton St., San Francisco. H. E. Metcalf, formerly chief engineer, the Magnavox Company, Oakland, Calif., is president and chief engineer of the new company, and he will also direct the laboratory at 307 Tenth St., Oakland.

**Neon Products, Inc.**, Longview, Wash., is planning the establishment of an electric sign manufacturing plant in that city. A. H. Robertson is president of the company, E. F. Dunlap, vice-president, and Gus Costaccos, secretary-treasurer.

**The Bussman Manufacturing Company**, St. Louis, has appointed W. E. Lang of that city its representative in Denver.

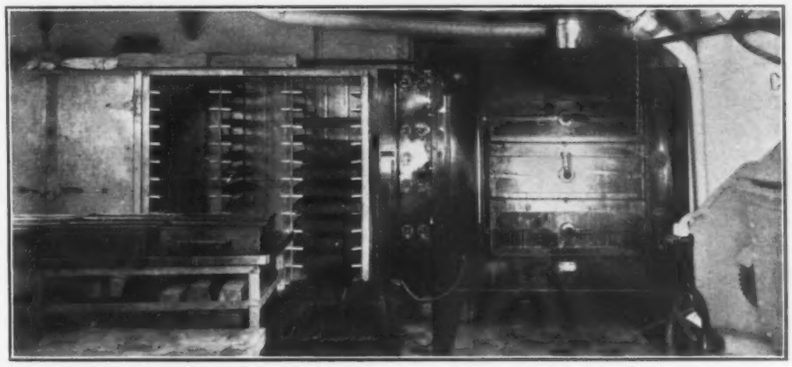
**The Ohio Brass Company**, Mansfield, Ohio, has appointed Frank W. Gorman as its district sales representative with headquarters in El Paso, Texas. The territory in which he will operate includes Arizona, Panhandle of Texas, New Mexico and Mexico. Mr. Gorman, formerly with the Mine & Smelter Supply Company, El Paso, relieves L. M. Keating who has moved to Mansfield to assume new duties in the company's general sales department.

**Allis-Chalmers Manufacturing Company, Milwaukee**, has opened a district sales office at 308 Heard Building, Phoenix, Ariz., covering Arizona, New Mexico and the northern part of Mexico. J. B. Cooper, whose headquarters formerly were in Los Angeles, is manager.

**The Majestic Electric Appliance Company, Inc.**, San Francisco, has announced that the United States Circuit Court of Appeals has reversed the decree of the district court for the Northern District of California adjudging infringement by the Majestic company of electric heater patent No. 1,518,067 issued to W. Wesley Hicks, and has remanded the case to the lower court with instructions to dismiss the complaint. Details relative to the decision rendered in favor of Mr. Hicks by the lower court were published in the Journal of Electricity, Nov. 15, 1926, p. 391.

**Resilient Terminals Company** is the name of a new company recently formed by J. P. Botelho and W. D. Vance, owners of Pacific Electric Motor Company, Oakland, Calif., and N. H. Watts. The company, which is situated at 88 Tenth Street, Oakland, will manufacture a resilient attachment plug and cord of soft rubber known as Unicord, under the direction of Mr. Watts, who is president. Mr. Botelho is vice-president and Mr. Vance secretary and treasurer.

**Sterling Electric Motors, Inc.**, 124 West Fourth St., Los Angeles, has moved into its new factory on Telegraph Road at Atlantic Blvd.

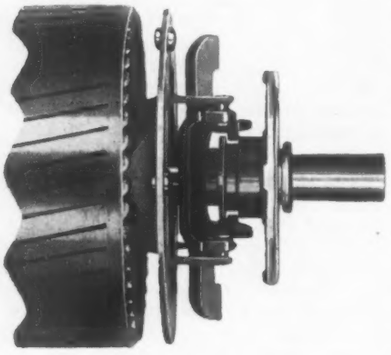


A corner of the galley on the Matson Navigation Company's steamship Malolo, showing one of the electric bake ovens installed by the Edison Electric Appliance Company, Inc. The galley equipment includes electric ranges, broilers, griddles and other appliances also installed by the Edison company.—*Photo courtesy Matson Line.*

# New Equipment

## Electric Motor

A new switch, capable of 500,000 starts and stops is one of the outstanding features of the new 58RB split-phase motor manufactured by the **Wagner Electric Corporation,** 6400 Plymouth Ave., St. Louis.



The switch is so constructed that it breaks contact instantaneously without dragging, multiplies the contact surface, never lengthens its time beyond that proper for the motor, gives wiping contact without rubbing and undue wear, will not rust, stick or bind, and the entire switch consists of a few simple parts with nothing to get out of adjustment, the company states.

In addition to this improved switch, the motor embodies an improved method of oiling, a heavy formed steel base which cannot be broken, drip-proof end plates, a spacious terminal easy to get at and well insulated to prevent grounding.

## An Electric Pancake Griddle and a New Hot Plate

Two new appliances being placed on the market by the **Swartzbaugh Manufacturing Company,** Toledo, Ohio, are

the Everhot electric pancake griddle and Everhot hot plate. Fast cooking with the pancake griddle is a feature stressed by the manufacturer, who states perfect control is obtained by the reciprocating heater switch. There are three heats—high, low and medium. The top is special alloy cast aluminum polished. The top is 12 in. square, height 5⅞ in., net weight 10 lb.

The hot plate, 22 in. long and 13⅝ in. wide, is an entirely new type, according to the manufacturer, who states that a patented unique application of highest quality heavy-gage nickel chromium resistance wire distributes the heat evenly over the burner surface, reducing the danger of burn-out. The heat in the burners is controlled by two reciprocating heater switches. The 8-in. burners of this wall-outlet-type hot plate develop tremendous heat quickly, the maker states. Intended retail price $15.

## Soft Rubber Plug

A new soft rubber plug has been added to its line by the **Belden Manufacturing Company,** 2300 S. Western Ave., Chicago. It is ruggedly constructed of solid soft rubber, can be dropped or knocked about without injury, and is shaped to form a convenient grip for the fingers when plugging in or pulling out. The insulating qualities make it ideal for use in damp places, the manufacturer states, and the soft rubber construction makes it highly desirable for all other devices which require a non-breakable plug for uninterrupted service. The plug is sold

only as a part of Belden cord service and is furnished attached to the company's many varieties of cords. Cords with plug attached are furnished in 10, 20 and 50-ft. lengths.

**Electrician's Knife**—The "Challenge" Electrician's Companion, manufactured by **Wiebusch & Hilger, Ltd.,** 106-110 Lafayette St., New York, is specially designed to meet the requirements of the electrician, radio and automobile mechanic. One strong blade has a keen lasting edge and sharp point for slitting insulation; the other blade may be used as a screwdriver, wire scraper or insulation cleaner. The screwdriver blade locks when open and cannot snap back; pressure on the large blade releases the screwdriver. A strong shackle is provided for attaching knife to hook or belt.

## Sprayer Operated by Cleaner

The Royal sprayer, which operates from air pressure supplied by the ordinary household vacuum cleaner, is announced by **The P. A. Geier Company** of Cleveland.

The device consists of a piece of 1¼-in. tubing, one end of which fits the

vacuum cleaner attachment hose, the other end terminating in a nozzle controlled by a simple thumb valve. Below the nozzle is fastened a standard jar cap with flow tube and compression inlet. Air pressure is supplied by connecting the vacuum cleaner attachment hose on the outlet, or blower side of the cleaner in place of the dust bag.

The Royal spray attachment, complete with adapter which permits it to fit any style of vacuum cleaner hose, is priced to retail at $4.50.

**Tumbolier Switches—The Hart & Hegeman Manufacturing Company,** Hartford, Conn., recently announced to the trade a new line of H&H Tumbolier switches for two and three-circuit connections, with one switch, one box, one plate. This switch makes a big saving in material compared to the use of a large three-gang unit, according to the manufacturer, and a common feed for each Tumbolier switch saves wiring time, as there is only one main connection.

**Ice Cream Cabinet**—A new two-hole self-contained ice cream cabinet, constructed with a completely sealed tank in which calcium chloride brine or alcohol and water may be used, is being made by **Frigidaire Corporation,** Dayton, Ohio. The compressor, equipped with a 1/6-hp. motor, is contained in the cabinet which measures 30 in. high, 20⅝ in. wide and 52¼ in. long with a shipping weight of 530 lb.

**Electric Ranges**—Four new products have been added to its line by the **Edison Electric Appliance Company, Inc.,** Chicago. These include three electric ranges, apartment house models R102 and R103, two-unit and three-unit, respectively, RA77 De Luxe all white porcelain enameled finish with automatic electric timer, and H52 coal and wood kitchen heater that can be attached directly to any of the company's models 73, 74 and 77 Hotpoint ranges.

### Automatic Starter

**The Industrial Controller Company,** Milwaukee, Wis., recently announced a new alternating-current, across-the-line type automatic starter for use with polyphase and single-phase motors. It provides push-button control, low-voltage protection and thermal overload protection.

The mechanism is mounted on a panel which fits into a dust-proof cabinet of heavy gage sheet steel, with door hinged at the side, and provided with latch for padlock. Terminals are accessible from the front of the cabinet. The maximum rating of this starter is 5 hp., all voltages. Outside dimensions are 7 x 8 x 4½ in.

**Meter Switches—The Killark Electric Manufacturing Company,** 3940 Easton Ave., St. Louis, has placed on the market a line of meter switches. These switches, made in fourteen different types, are designed to fit directly under the meter and can be sealed or locked by the power company. The main switch can be thrown in an "off" position and the branch circuit fuses reached by the householder without breaking the seal on the box. The switches are designed to be used with either two or three-wire service and with one, two or four-branch circuits.

**Hi-lift Hoist—The Northern Engineering Works,** Detroit, has added to its line of cranes and hoists a new series of Hi-Lift hoists. The company states that the new Hi-Lift is of compact design, rigid construction and that besides ready accessibility and high efficiency in operation it features an exceptionally high hook-lift.

**Safety Iron**—The Universal super-automatic iron announced by **Landers, Frary & Clark,** New Britain, Conn., has as its exclusive features, finger tip control of ironing temperature; automatic indication when the current is on or off; round heel so that there is no wrinkling on back strokes, and positive cut-off when maximum ironing temperature is reached. Weight 6 lb. List $7.75.

**Elevator Control Devices**—Three new control devices for elevator service, a limit switch, a reverse phase relay, and a car switch, have been announced by the **General Electric Company,** Schenectady, N. Y.

**New Refrigerator Model**—A new electric home refrigeration model, finished in white pyroxlin lacquer, has been introduced by the **Electro-Kold Corporation,** Spokane.

**"OB" Watthour Meter Line Completed**—The **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, has announced that it has completed its entire line of "OB" watthour meters.

## Recent Publications

**Lighting Equipment—The Edwin F. Guth Company,** St. Louis, Mo., is distributing its No. 18 Commercial catalog. In this catalog is illustrated a general line of commercial as well as a better grade of conventional, designs in standard periods of architecture for use in churches, schools, banks, office buildings, hotels, stores and a few for residential purposes. The company is celebrating its twenty-fifth anniversary, having been engaged in the design and manufacture of lighting equipment since 1902. Copies of the catalog may be secured from L. A. Hobbs, Pacific Coast manager, 555 Bush St., San Francisco, or from district offices in Los Angeles and Seattle.

**Federal Safuse Panels**—Bulletin SP3 has been issued by the **Federal Steel Products Company,** 2-14 Avenue L, Newark, N. J., covering its entire line of Federal Safuse panels. The panels are fully listed and illustrated in flush and surface types with and without arrangement for toggle switches, and the through feed type. Electric Agencies Company represents the firm in San Francisco, and the R. M. Burton Sales Agency in Seattle.

**Acorn Line**—This is the name of a catalog supplement published by **Harvey Hubbell, Inc.,** Bridgeport, Conn., covering its Acorn line of plates, switches and receptacles. There are numerous illustrations, many of them in color. The Sales Service Company, 1109 Broadway, Denver, and Garnett Young & Company, 390 Fourth St., San Francisco, represent this concern in the West.

**Resistors**—Bulletin 111 of the **Monitor Controller Company,** Baltimore, Md., describes and illustrates its line of edgewound, hexwound and smooth-wound resistors. The concern is represented by the Electric Materials Company, Inc., San Francisco; Bell & Slimmon, Los Angeles; and W. Montelius Price Company, Seattle.

**Geared Turbine-Generator Unit.**—Leaflet No. 20293 published by the **Westinghouse Electric & Manufacturing Company,** East Pittsburgh, Pa., describing a.c. and d.c. geared turbine-generator units, with ratings of from 75 to 500 kw.

**Deep-Well Turbine Pumps**—Bulletin 22-A describes the deep-well turbine pumps manufactured by **The Pelton Water Wheel Company,** Nineteenth and Alabama Sts., San Francisco.

**"Vertical Waterwheel-Driven Generators"** and **"G.E. Insulating Materials"** are two publications recently issued by the **General Electric Company,** Schenectady, N. Y.

**Sales Promotion and Refixturing Campaign of the A.L.E.A.**—The **Artistic Lighting Equipment Association** has compiled in booklet form information to serve as a guide to the sales promotion and refixturing campaign developed for the use and benefit of all in the lighting industry. The purpose of the booklet is to present the entire program so that each step of the campaign may be studied with relation to the plan as a whole. Specific directions are given for the use of emblems and slogans, sticker labels, string tags and the different types of advertising. Wnidow and store displays and the distribution of booklets on exterior lighting and lanterns also are discussed.

**Pemco Products**—Catalog No. 35 of the **Philadelphia Electrical & Manufacturing Company,** 1228-36 North 31st St., Philadelphia, contains, according to the company, the latest printed information relative to Pemco products, which include lighting standards, brackets, lanterns, fixtures, lighting units, mast arms, globes, reflectors, sockets, receptacles and insulator pins. The Robinson Sales Company, Seattle, and J. B. S. Agencies, Los Angeles, represent the company.

**Electric Fans**—"For Pure, Fresh Air and Health," a booklet published by **The Robbins & Myers Company,** Springfield, Ohio, is the name given to a miniature fan catalog, form 1355, covering its line of electric fans for 1928. This company also has published Bulletin No. 1379 covering its golden-green finished fans, and "New Sales Helps for Your 1928 Fan Business," a dealer-help folder covering the company's entire campaign for the coming year.

**Wiring Device Products**—This publication, K-27, superseding K-16, covers the line of wiring devices manufactured by **The Cutler-Hammer Manufacturing Company,** Milwaukee, Wis. Copies may be obtained from the company's Pacific Coast offices at 970 Folsom St., San Francisco; 229 Boyd St., Los Angeles; and 2207 First Avenue South, Seattle; L. Brandenburger, 149-151 West Second South St., Salt Lake City; and H. L. Vaughan, 536 U. S. National Bank Building, Denver.

**L. H. Electrics—Ranges and Appliances**—These catalogs, respectively 28-R and 28-A, published by **A. J. Lindemann & Hoverson Company,** Milwaukee, Wis., describe and illustrate that company's hot plates, urn heaters, water heaters, air heaters and kitchen heaters, and its line of waffle irons, toasters, table stoves, curling irons, heating pads, electric irons and similar small appliances. The concern is represented in the West by Alexander & Lavenson Electric Supply Company, San Francisco; Listenwalter & Gough, Los Angeles; North Coast Electric Company, Portland, Seattle, Tacoma; Salt Lake Hardware Company, Salt Lake City.

# ELECTRICAL WEST Barometer of Industrial Activity in Western States

DATA ON the consumption of electrical energy by some 400 large manufacturing plants in the Western states indicate that during January the rate of production of Western industry as a whole was about 1.6 per cent under that reported for December. This slight drop in the rate of general industrial production in this section was due almost entirely to a material drop in the operations of the plants turning out food and kindred products; in fact this is the only industrial group reporting operations under those of December. For the first time since last August operations during January were under those of the same month in the year previous.

The material drop of 23.3 per cent in the operations of the food industry during January was hardly to be expected. It is perfectly normal for these plants to reduce their operations at this season of the year, but the reduction recorded was far above that of past years. The drop, however, was general throughout the section, only a few plants reporting energy consumption near that of December. On the other hand other outstanding industrial groups reported increased operations, as follows: chemicals and allied products 21.3 per cent, lumber and its products 7.7 per cent, metal industries 23 per cent, paper and pulp 2.8 per cent, rubber and its products 23.4 per cent, shipbuilding 0.4 per cent, and stone, clay and glass 6 per cent. The heavy weight given to the food group, however, was such as to pull down the general industrial index of activity to a point slightly under that of December.

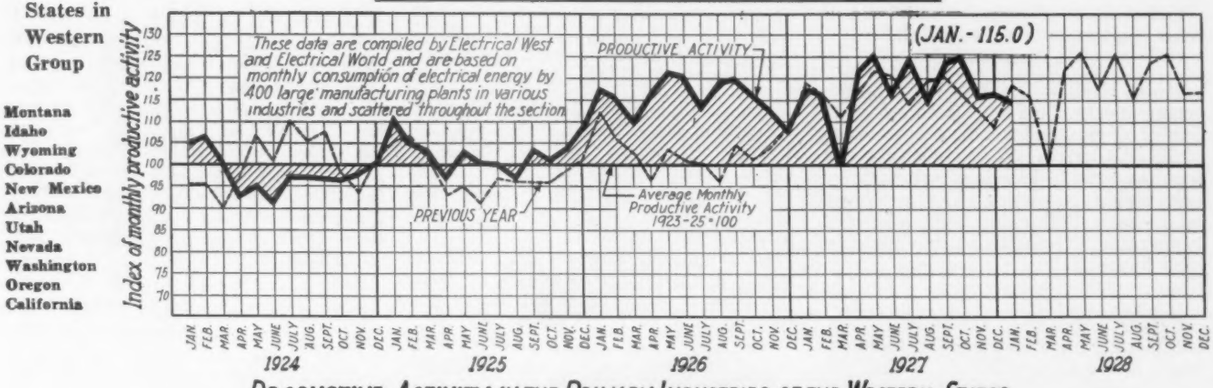
January witnessed a material increase in the operations of general industry in the nation as a whole, only three of the nation's primary industrial groups—food and kindred products, lumber and its products and paper and pulp—reporting decreased operations for that month. The rolling mills and steel plants reported an increase of 18 per cent over December, and operations in the automobile industry including the manufacture of equipment and replacement parts were 27 per cent over December. An upward trend of considerable proportions is expected at this season of the year, but the fact that the impulse was felt by a very large proportion of the industrial groups instead of being confined to a few groups is a significant fact, offering an excellent basis for prognosticating a continuance of our present general industrial prosperity at least through the first half of 1928.

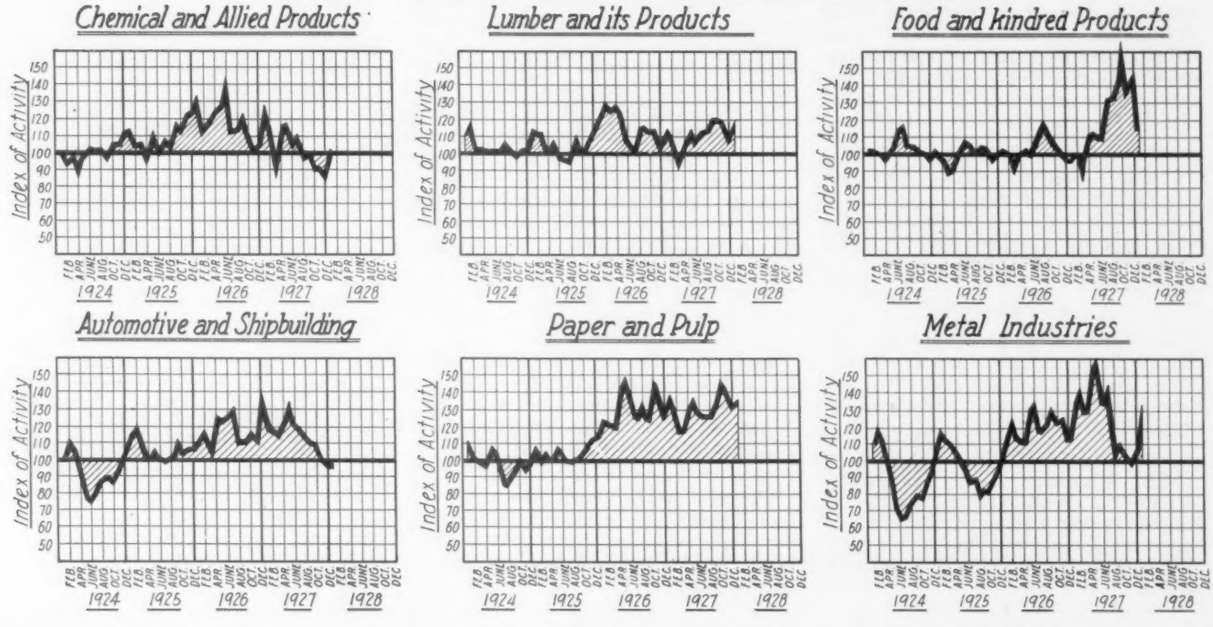
**INDEXES OF PRODUCTIVE ACTIVITY IN THE WESTERN STATES**
**(All figures adjusted for number of working days.)**

| | Jan. 1928 | Dec. 1927 | Jan. 1927 | Average for full year 1927 |
|---|---|---|---|---|
| All industries | 115.0 | 116.9 | 118.7 | 118.8 |
| Chemical and allied products | 102.8 | 84.7 | 127.4 | 103.4 |
| Food and kindred products | 113.8 | 148.5 | 95.3 | 123.2 |
| Lumber and its products | 119.2 | 110.7 | 114.8 | 112.4 |
| Metals industries group | 133.8 | 108.8 | 135.4 | 127.3 |
| Paper and pulp | 136.2 | 132.4 | 139.5 | 133.3 |
| Rubber and its products | 140.2 | 113.7 | ..... | ..... |
| Shipbuilding | 96.3 | 95.8 | 129.3 | 114.6 |
| Stone, clay and glass | 150.4 | 142.0 | ..... | ..... |

## GENERAL PRODUCTIVE ACTIVITY IN THE WESTERN STATES

*- Adjusted for number of working days but not for seasonal variation.*




## PRODUCTIVE ACTIVITY IN THE PRIMARY INDUSTRIES OF THE WESTERN STATES